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San Francisco, Calif.

April 15, 1926
25 Cents

Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

BIG EVENTS IN ELECTRIC REFRIGERATION

ON February 27th, the Delco-Light Company announced six new Frigidaires, built complete with metal cabinets. A National Demonstration of these and other Frigidaire models was held from March 25th to April 3d.

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ELECTRIC REFRIGERATION

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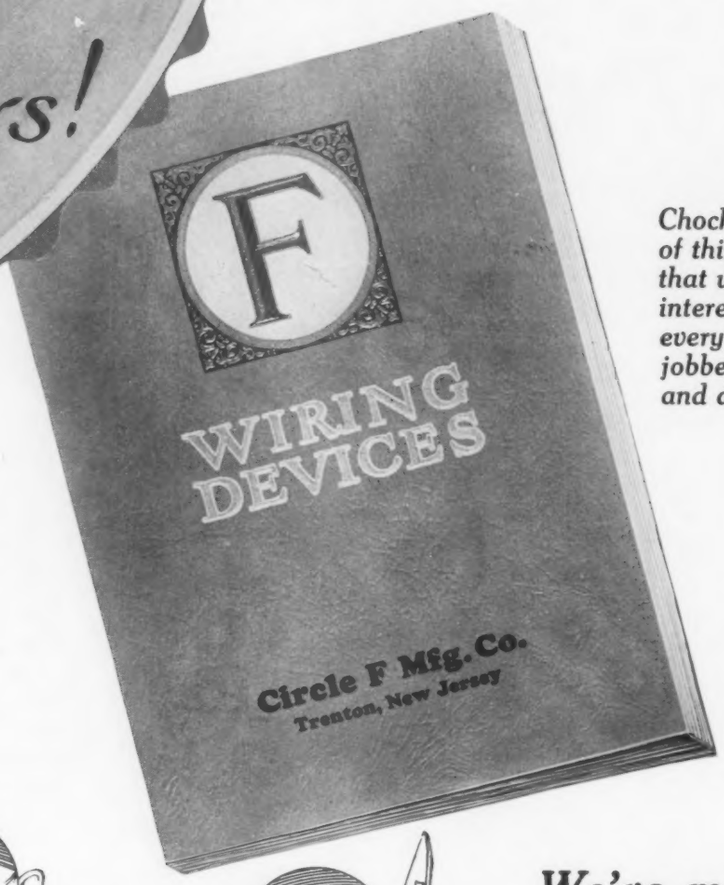

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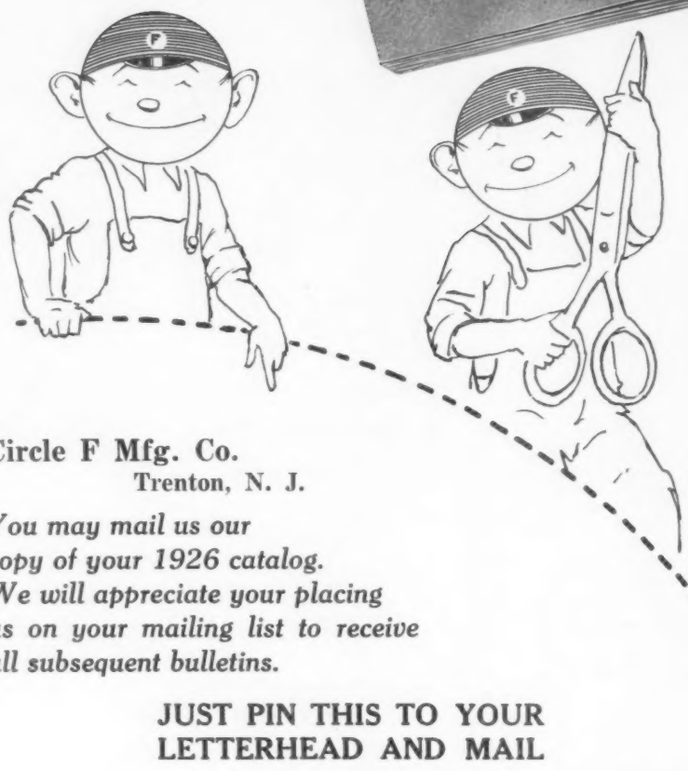

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Devoted to the Economic Production and Commercial Application of Electricity

IN THE ELEVEN WESTERN STATES

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"Glad I Had It Sent Home"

IN conversation with one of the editors of the Journal of Electricity, an executive of a power company made the following significant statement:

"I'm glad that I asked your magazine to have my copy of the Journal sent to my home instead of to the office. It has proved to be one of the wisest of decisions, for now I find that I can pick it up in the evening and devote much more time to a careful reading of its contents. Consequently I am getting more out of it than I ever did before when it came to the office to compete with all the affairs of a busy day for a moment's attention."

There is in this man's experience a meed of good advice to others who receive the Journal. Taken home and read there at leisure, neither crowded nor interrupted by the affairs of the moment, any reader may assure himself of a well balanced ration of information concerning his business in all of its ramifications. A trained editorial staff arranges for each issue the finest product of thought upon the problems and methods of the day. Correspondents in all fields supply accurate information regarding late development works. Editorials digesting the passing phases of a fast-growing industry are to be found in each copy. These deserve a careful study and a thoughtful perusal.

Moreover, such a leisurely reading will repay one deeply. To anyone engaged in the electrical industry the richer knowledge of its constantly changing panorama which careful reading of the Journal provides will serve to keep that reader abreast of development, of current thought and of improved method. Each of these will be reflected in whatever activity the careful reader participates in and result in his better preparation for the tasks and the rewards of tomorrow.

Worth looking into!

**The Single Wall won't clog.
Its Roller Bearing Wireway
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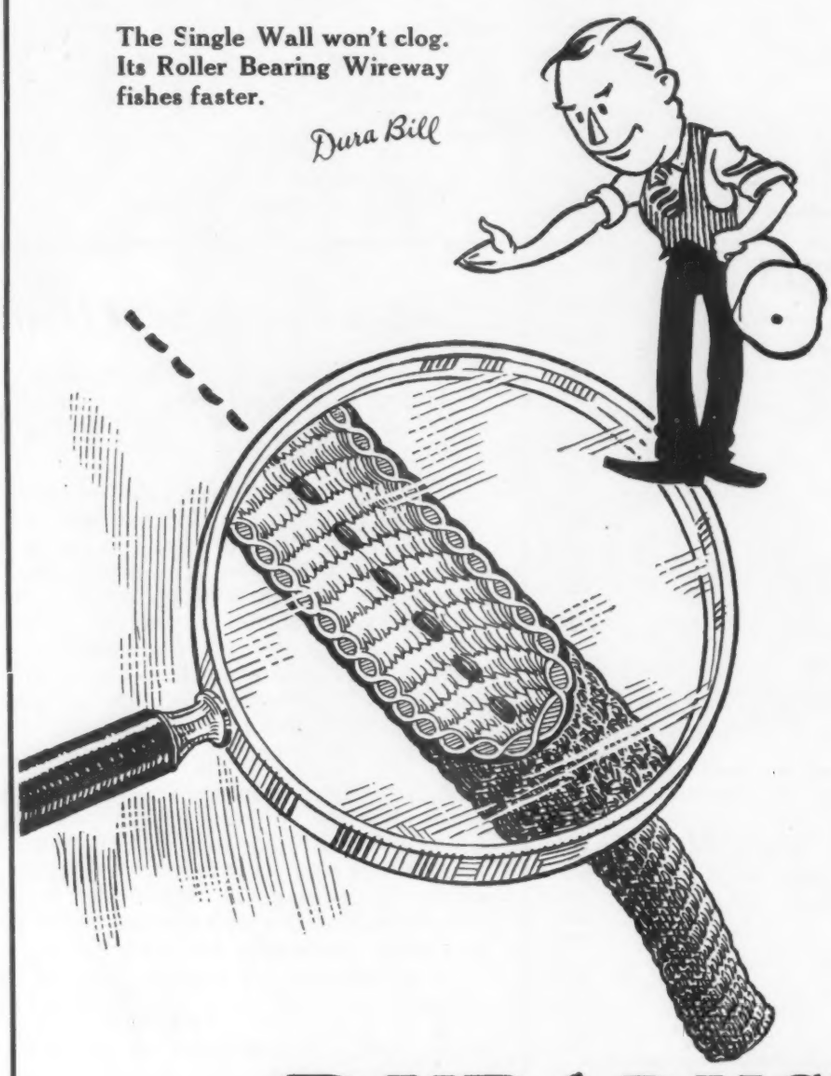
Dura Bill



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EDITORIAL

Domestic Refrigeration—A Big Selling Job

BECAUSE the attention of the entire electrical industry is centered upon electrical refrigeration, considerable space in this issue has been devoted to that subject. Working on the premise that central stations already are sold on the advantages of domestic refrigeration from a load-building standpoint, most of the material is of a sales character dealing with both proved and projected selling campaigns.

However, for the benefit of those executives who are not familiar with the desirabilities of the domestic-refrigeration load a few remarks on this subject have been included as not being entirely amiss. Electric refrigeration is doubly desirable because it combines a good load factor with a high earning capacity. Although rated at 250 watts only, a single refrigerator will show a load factor of from 35 to 45 per cent and groups of machines will average 60 to 70 per cent. A refrigerator will return between $3 and $5 per month, depending upon the rate it earns. In terms of other appliances its annual return in revenue will equal 32 washing machines, 50 fans or 11 irons. The annual revenue for each kilowatt of demand for the refrigerator will equal the annual revenue for each kilowatt of demand for 4 electric ranges, 53 waffle irons or 36 toasters. Coupled with this is the fact that it can be served without any investment in new equipment. Seemingly this would clinch its case with the central station.

With these facts in mind, the job then is one of selling. It is conceded that, aside from the comparatively well-to-do, who are immediate prospects, the primary selling job is one of educating the public to the necessity of refrigeration itself. After this, mention can be made of the advantages of electric refrigeration and the real selling campaign launched. Commercial men can gain much from the discussions on other pages of this issue regarding selling plans of some of the companies who have undertaken and who are undertaking the sale of domestic electric refrigerators. Nor is the contractor-dealer overlooked. One writer, in relating the experience of his firm, proves conclusively that electric refrigeration is a promising field for profit for the contractor-dealer.

Our readers are commended to a careful study of the material in this issue. One does not need to be a prophet to say that electric refrigeration is no longer an idle dream. It is an accomplished fact. Those who are among the first to put their shoulders to the wheel will be the ones who will profit most from the development of this new field.

Denver Threatened with Municipal Ownership

DENVER, chief city of the Mountain empire, finds itself in the throes of a problem concerning its electrical future. The expiration of the public-utility company's franchises in May have been made the opportune basis for one of the most peculiar and subtle political contests in modern time. If it were merely the municipality versus the utility company—the usual line-up—the people of Denver might think the problem mere child's play, but Denver's is not so simple a question.

The utility company's franchise expires in May. It aspires to renew this franchise on the basis of having given the public good service and fair rates. There is no decided complaint against the company, and under ordinary circumstances the renewal of the franchise would be granted as a matter of course, as it should be, considering the investment of the company in the community, its past record, and its policies.

But the granting of a franchise sometimes has been made a political "sword of Damocles," threateningly held over the head of the utility. Denver politicians have seen fit so to play with their present power over the utility virtually at their mercy. To this end a valuation of the company's' property is to be made, experts having been retained by both the city and company for these proceedings. And even the Chamber of Commerce has wanted to put a finger in the pie by appointing its expert to investigate and "protect the rights of Denver business men."

As if this were not enough, an entirely extraneous influence is thrown in at this breach to hold out luringly to the city administration a possible hydroelectric program on its water system for which all the rosy promises of any municipal scheme of course are made. This intrustion is made by a group of engineers, lawyers, and financiers anxious to build the system on what was known in the army as "jawbone," to be paid for out of "profits," and to cost nothing if not successful. It is as pretty a "30-day trial offer" with the usual "no obligations to purchase" as ever came out of a mail order brochure.

The very enticing nature of this "free—pays for itself out of the profits it makes" offer and its

evident favor with a gullible public has thrown into an already muddy stream more to darken it. The scheme for hydroelectric development proposes to develop the South Platte River and is predicated on this stream being able to provide the city with adequate water for its domestic uses, which it has not yet done. By concentration of water development on this one stream, however, the dependence upon the famous Moffat tunnel would be removed, and the district which is responsible for the Moffat faces the possibility of having to bear all the cost of this project without the help of a Denver water-supply project, which was very important as a consideration in the beginning of the development. This threatened "double-crossing" of the Moffat project for the new love, a municipal hydro plant, has been said to underlie the resignations of members of the city water board.

What is this whole situation, anyway? A free-for-all? Are vital services to a community something which everyone can take a hand at regardless, or are they specialized services of men who have devoted their lives to their study? The promoters of this hydroelectric scheme have the effrontery to suggest that the city build these plants, sell their output to the public-service company to distribute, and pay for them thus at the expense of the company's investment in steam plants. In this way the cost of the project would be absorbed presumably by the time the renewed franchise of the company should run out, in twenty years from now, and the company would have "good-fellowed" itself out of existence.

Are legitimate investments of millions in the present power plants and distributing systems to serve Denver to be so lightly considered by an ambitious administration? The utility company for years has investigated all possible hydro sites and decided that steam power would be more economical. The question casts a shadow upon the good faith of public institutions. Is the Moffat tunnel to be abandoned by the city largely responsible for its inception because some other tempting tidbit presents itself? Is the city of Denver to become another victim to a "mail order" stunt of financing and engineering? The idea seems to hint danger from its very blandness and "big-heartedness." These are questions which Denver faces and must answer. What that answer will be only a test of the public's fairness or gullibility will prove.

B.C. Electric Proves Soundness of Customer-Ownership Idea

WITH more than ten years' successful experience with the customer-ownership idea in the United States, utilities have reached the point where record stock-selling campaigns cause hardly more than a ripple on the surface of the industry. One Pacific Coast utility, the British Columbia Electric Railway Company, has established such a remarkable record during the past month that the industry has cause to pause and consider and even profit from the experience of this Canadian company.

As set forth elsewhere in this issue, the British Columbia company, with a population of only 350,000 to draw upon, received applications for more than $7,000,000 of shares of prior preference stock in five and one-half days. Among the many outstanding features of the campaign were the following: Only $2,250,000 was included in the initial offering, and the entire issue authorized was but $5,000,000. Applications were limited to fifty shares and only residents of British Columbia were allowed to participate. Employees of the company brought in applications from 10,851 people for $5,625,350. Only $1,500,000 was marketed through bond dealers. Forty-seven per cent of the employees applied for stock. So spontaneous was the public reception of the campaign that much of the newspaper and other advertising was not used because the issue was oversubscribed so soon.

There are many factors which have a definite bearing upon the success of the company's initial customer-ownership effort. In the first place there appears to have been a large volume of liquid assets in the savings banks of the province belonging to people of comparatively small means. These people never had been in the habit of investing and never were inside a broker's office. This is indicated by the fact that of 10,000 applications received more than 3,000 were for a single share of stock.

Then it is impossible to overlook the high standing of the company itself. It practically dominates the territory insofar as electric, gas and street railway service is concerned. With the exception of the Canadian Pacific Railway, there is no company with such large interests in the territory. Moreover, the company has been consistently building up good-will for ten years both through service and publicity. For several months before the campaign the public mind was prepared to regard the public utility as an essential industry and one of the soundest fields for investment through newspaper and other publicity.

Every advantage was taken of the 3,000 employees and the many company offices to make investment on the part of the public as easy as possible. Finally those in charge of the campaign tackled it with the realization that it would be a hard job and no stone was left unturned to assure its success.

The British Columbia Electric Railway Company deserves the congratulations of the industry of the entire continent for the splendid showing it has made. Its success in this initial campaign justifies all that has been written and spoken regarding customer-ownership. The remarkable record achieved indicates public confidence in the integrity of the company—a fact which is borne out also by the fact that Vancouver is one city where there is practically no sentiment in favor of municipal ownership.

DISCUSSION

Engineer Explains Stand Regarding Hetch Hetchy Power Cost

To the Editor:

Sir—It is to be regretted that City Engineer O'Shaughnessy has made a controversial matter of certain facts relating to the Hetch Hetchy power and water-supply project. San Francisco has entered upon an unwise program and cannot turn back. The city must now make the best of the present situation. It is immaterial whether this situation, making for high cost of power and water, and for a long deferred completion of the water-supply project, is due to the terms of the Raker Act or to other causes. The question now is what is or what will be the relative investment in the power plant and in the water works. To this question my comments* were directed and in settling this question something more is needed than a resolution of the Board of Supervisors. The city engineer tells us that for the present $21,000,000 should be considered as the capital expended for power. The supervisors appear to want this amount materially reduced. The figures relating to cost to some recent date now presented by the city engineer** throw but little light on what should control the apportionment of cost to power development and to the water works. They do not, for example, include, as they should, interest during construction.

I am not commenting at this time on the merits of the arrangements with the Spring Valley Water Company, and need only say that my understanding with reference to the Calaveras pipe line has been that in return for the consent of the water company to use this pipe the city is making some sacrifice in interest on its cost and is assuming the entire item of pipe depreciation. My reference to this feature of the city's project was prompted by the fact that if the city had adhered to its original water-supply project under progressive development, the pipe long ago would have come into use for Tuolumne River water. The question is not that suggested by the city engineer as to the fairness of the conditions of the lease to the water company, but as to what part of the cost of installation of the pipe at this time and its operation until needed for Tuolumne River water is chargeable to power. The city may take all the comfort which the high type of construction aimed at by the city administration, justifies, but the fact remains that both power and water from the Hetch Hetchy system will be unusually expensive. As a guide for its further activities in the public-utility line, the city may well consider whether it would not have been better at each step toward a realization of a water-supply project to have given as much thought to the wisest policy to be followed as to the project's engineering features.

I would prefer to stop here but some of Mr. O'Shaughnessy's statements will be misunderstood if not explained. Thus, for example, he says that the $45,000,000 original bond issue covered a water-supply project for 60,000,000 gallons per day. He does not state that the 60,000,000 gallons was the first unit of an ultimate larger development nor that this cost estimate is not comparable with the cost of delivering Tuolumne River water into the Crystal Springs reservoir as proposed under the present project, because the original bond issue included $12,000,000 for a city distribution system and it did not include the cost of a power project. He further says that the city was ordered to show cause why the Garfield permit (of 1908) should not be revoked. The order was to show cause why this permit insofar as it related to the use of the Hetch Hetchy Valley as a storage reservoir should not be revoked. The issuance of the permit was preceded by my own investigations, as city engineer, 1901 to 1903, which led to the selection by me of the Tuolumne River as the most available source of mountain water for San Francisco. The review of the situation by the Board of Army Engineers some years later and their confirmation of my conclusion was of course a source of gratification to myself. This does not mean that I now nor at any time in the past have ever approved of the deplorable Raker Act, the terms of which should never have been agreed to by San Francisco.

The amount which Mr. O'Shaughnessy reports as having been expended to some recent date may of course be accepted as correct, but the comparison which he makes of this $43,550,000 with the figure which I have named as approximating the city's present day investment is misleading. He overlooks the unpaid obligations and actual expenditures on construction since the date to which his financial statement applies and he also forgets that about $10,000,000 raised by taxation and paid during the last ten years as interest on bond issues represents capital investment. When these amounts are added to his $43,550,000 the aggregate will be large enough to justify my assumption, made without examination of the books, that about $60,000,000 are now invested in the project. An examination of the records may, of course, show that the actual investment, with proper allowance for any money returned to the city treasury out of earnings, is nearer $55,000,000 than $60,000,000, named as approximate, but this will not alter the situation to which I have called attention.

C. E. GRUNSKY.

San Francisco, Calif.
March 29, 1926

*Published in letter form in Journal of Electricity March 15, 1926, page 208.

**Published in the Journal of Electricity, April 1, 1926, page 246.

LAKE CHELAN, Washington, seen in the upper part of this photograph, is soon to serve as a storage basin for a new 50,000-hp. plant to be erected on the Columbia River, in the foreground, by The Washington Water Power Company.

Trial Plan Works Effectively

By R. B. McElroy
Assistant Sales Manager, The Washington Water Power Company, Spokane, Wash.

SINCE 1923 this company has been an active merchandiser of electric refrigerators. When it found that its first prospects were skeptical of domestic refrigerators it tried successfully the plan of placing them on trial in responsible homes. Not one was returned, and thus established the business has grown consistently.

WHEN The Washington Water Power Company decided to consider the matter of selling electric refrigerators, and that was in 1923, it had no precedent to look to for the establishment of its policies and plan except those policies which pertained to appliances of a similar load-building character, the electric range and water heater. Electric refrigeration, a domestic application, was something still untried. And yet, because it seemed a logical next step in home electrification, it was thought worthy of more than just casual consideration. Consequently all during the year 1923 this company investigated as best it could the various refrigerating plants on the market at that time.

After selecting a plant which met our requirements, the next step was to secure men and to train them in the factory itself to fit them for the task of selling electric refrigeration in the home.

As soon as the company was ready to announce its intentions, that it had selected a make of electric refrigerator for home use, several large display advertisements were carried in the newspapers, telling all our customers about the plant selected, electric refrigeration in general, and the company's willingness to have them consider with it the advantages of electric refrigeration.

With actual sales work ready to begin, our men made personal calls on such prospective purchasers it was known definitely were in financial position to install a plant if they could be shown its value. Our salesmen encountered from these prospects a skepticism as to the value of domestic refrigerators which proved to be a decided obstacle. Each prospect felt that he would be willing enough to purchase a plant if he could be assured that it would give satisfaction.

The obstacle being of such a nature, it was decided that the company should select 25 prospects and should offer to install a plant in their homes without any charge to them, they to keep it for six months, at the end of which time, if in their judgment it was perfectly satisfactory, they could either pay for the plant in cash or on a monthly payment plan. In selecting these people care was exercised to place these plants with people who, at the end of the trial offer, would be in financial position to go through with the offer if they were satisfied with the machine.

Of these 25 people each one kept the plant after the trial offer, and all reported the plants as giving entire satisfaction. From these same people company salesmen since have secured many additional prospects, most of whom have been sold, and the others are still being called upon and are considered good prospects for an eventual sale.

Newspaper advertising dealt entirely and extensively with what refrigeration would do for the home, at no time knocking the ice man or ice as a refrigerant. It has been the company's attiutde since the beginning that if it cannot sell domestic refrigeration on its merits and not at the expense of knocking some other industry, it cannot continue in this line of business.

In addition to the newspaper advertising, a selected list of 500 people was gathered. In this list were only people in such circumstances as to be able to afford a refrigerating plant. At intervals of ten days a series of three letters on refrigeration was sent them, enclosing folders describing the particular plant the company handled. With the last letter a postcard was enclosed which the prospect might mail back to the company, allowing our salesman to call at the home in person and explain the proposition. This direct-by-mail advertising was very satisfactory.

Wherever an opportunity to display an electric refrigerator presents itself, as at a fair or community gathering of some sort, a display is

Customer's Letter Authorizing Placing of Refrigerator on Trial

.....Date.....

**The Washington Water Power Co.,
Spokane, Washington.**

Attention of Mr. .....(Salesman's Name)....

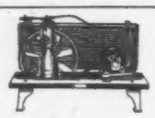
Gentlemen:

Confirming our conversation relative to the placing of a .....(Size)..... cubic foot Electro-Kold Refrigerating Plant in my residence located at .....(Address)....., beg to advise that you are authorized to make this installation at once.

It is my understanding that you are to install the refrigerating plant in my residence on trial until.....(Trial Period Date)..... after which time, if the plant has proved satisfactory to me, I will agree to pay you .....($.....)..... cash or .....($.....)..... on your term payment plan. However, if the plant has proved to be unsatisfactory, you are to remove same from my premises without any charge whatsoever to me.

Very truly yours,

Introducing ELECTRO-KOLD
Refrigeration Systems for Every Home



Electro-Kold Power Plant

This picture shows the little power plant and mechanism of "Electro-Kold" home refrigeration plants.

Takes very little room and is generally placed in the basement.

Requires but a small amount of electric power to operate it, as a thermostat automatically controls the temperature in your refrigerator—and also stops and starts the motor.

For years delicatessen shops, butcher shops, restaurants and grocery stores have had refrigeration plants. Now comes the day of home refrigeration.

Electric appliance people have been working on the problem of home refrigeration for years. Many splendid systems have been evolved.

We have examined most of them and as a result have selected "Electro-Kold" as the one system that we can sell and recommend.

Electro-Kold has no frosted pipes—it can be installed in any good refrigerator—while the electric mechanism that operates it is placed in some small out-of-the-way place in your basement.

"Electro-Kold" equipment is not expensive—takes only a few hours to make installation.

"Electro-Kold" Home Refrigeration Systems Sold on Popular Monthly Payment Plan

Make Dainty Ice Cubes for Table Use

Dainty ice cubes for cold drinks or table use are frozen in neat little trays from your pure drinking water. Salads, desserts, parfaits, mousses or other dishes can be frozen in these trays. Furthermore, one of the exclusive features of ELECTRO-KOLD is a compartment where meat or game may be placed and frozen, thus ensuring its perfect preservation.

Meet Our Expert on Home Refrigeration

MR. A. E. KNIGHT

There is such a big demand for home refrigeration that it has been necessary for us to go into this business in a big way.

We have engaged the services of Mr. A. E. Knight as expert in this line.

Come in and meet him.

If you want a home interview just call Main 5171 and Mr. Knight will call at your home and explain all the wonderful advantages of this, the very newest in modern home equipment.

"Electro-Kold" Home Refrigeration Systems Are Manufactured Right Here in Spokane by Electro-Kold Corporation

"Kold Facts"

Takes only a few hours to install an Electro-Kold system in your home, sweet home.

Then you are assured of pure, healthful refrigeration at all times.

No drain pipes to clean, no drip pan to empty.

Electro-Kold maintains an even temperature always below food spoiling point, which allows you to keep edibles for weeks and months.

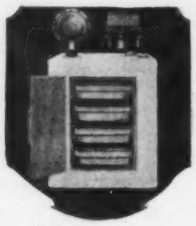
Can be installed in any good standard make refrigerator.

Cost of operation very small, as motor runs only when needed.

The Wa... Water ... Company

Corner Trent and Lincoln. "Electro-Kold—Made in S... throughout the Inland Empire

Electricity now furnishes you Perfect Refrigeration



Meets „ Every „ Refrigerating Requirement

ELECTRO-KOL...

Home Refrigeration Pl...

Produce Uniformally Cold, Dry, Crisp Air

Winter and summer, day in and day ... refrigerator will always have the same ... ture.

This is one of the features of "Electro-Kold" that home folks appreciate greatly.

"Electro-Kold" can be installed in any good refrigerator—there to give you perfect refrigeration at extremely small cost.

Sold on Convenient Terms of Payment

Make Your Own Ice for Table Use

A special compartment in the Electro-Kold will freeze dainty ice cubes for table use. Utilization of the same water you use for drinking and cooking insures the utmost purity.

In this compartment you can freeze cream, sherbets, mousses and other tasteful desserts at your pleasure with no additional expense.

The Washington Water Power Co.

Corner Trent and Lincoln | Telephone Main 5171.

...t Us Tell You Abo...

...LECTRO-KOL...

...is the new and modern system of home refrig... being adopted by so many Spokane homes.

...e refrigeration—scientific and healthful care ... thing we are all interested in. For that rea... glad to follow us while we enumerate some ... vantages of "Electro-Kold":

Can be installed in any good refrigerator.

Economical, b... motor runs only when needed.

A freezing compartment makes pure ice cubes for table use.

The same compartment will freeze fish, fowl, maintain them in perfect refrigeration for a long period of time.

Ice cream and frozen dainties can be kept from day to day.

The even temperature maintained below food-spoiling point allows you to keep all edibles a very long while.

The clean, dry, crisp, intense cold prevents dampness or the possibility of odors.

"Electro-Kold" produces pure and healthful refrigeration all the time —without variation of temperature.

Sold for Cash or on Convenient Terms of Payment

Telephone Main 5171

and our "Electro-Kold" expert will be pleased to call at your home or place of business.

The Washington Water Power Co.

Telephone Main 5172 | Corner Trent and Lincoln

...rrect Refrigeration for Your Home

ELECTRO-KOLD

Refrigeration means more than just a cold ice box.

Correct refrigeration in the home can be had by means of the new Electro process, whereby the same temperature is maintained in your refrigerator every minute of the day—winter and summer.

Electro-Kold refrigeration produces cold, crisp, dry air—pure and healthful

In a special compartment you can freeze ice cubes of uniform size for cooling summer drinks.

Meat and fowl can be frozen and kept for almost an indefinite period of time.

Let our Electro-Kold expert call at your home and explain the other interesting details.

The Washington Water Power Co.

Corner Trent and Lincoln | Telephone Main 5171

Some of the effectively written advertisements and folders used by The Washington Water Power Company last year in its third season of electric refrigerator sales. The appeal of a make of refrigerator produced in its own territory was used also to good advantage. In a territory of 33,000 residential customers, 24,500 of which are in Spokane, already 137 plants have been sold, and the quota for 1926 is 250 more.

made. This has been found to be a very effective method of showing the refrigerator, and interest in the plant is found invariably to be keen.

Located as we are, in the same city with the factory from which we get our refrigerators, we have entered into an agreement with the factory to service all plants in operation on a time and material basis. To date the servicing has run far less than was anticipated and with correction of preliminary minor difficulties which showed up by the manufacturer, we feel that the servicing feature, so much discussed, is not going to be a serious objection in the future. Where plants are located on our system, outside of Spokane, it has been our practice to have a local man from each town spend about a week at the factory studying the mechanical features of the refrigerator we merchandise, so as to enable him to do the servicing for that locality.

In summing up our electric refrigerator experience, we cannot help but feel that this type of load is one of the most profitable and satisfactory loads a central station can have. From our records, taken during the past year, it has been found that the kilowatt-hour consumption varies from 60 to 75 per month, which at a rate of 3 cents per kw-hr.. will result in a very satisfactory annual revenue, particularly in view of the fact that no additional expenditure of money in capital costs is necessary to take on this load.

Our policy as relates to price is that the refrigerators are sold at the list price installed, and with each sale we provide a year of free service to the appliance. An additional charge is made, however, when the plant is purchased on the monthly payment plan to care for the cost of the financing. After the first year, all servicing is paid for by the customer on a time and material basis.

In discussing domestic refrigeration with those who have purchased machines from the company, we have yet to find one user who is dissatisfied. In fact we never have had a plant turned back to us because of dissatisfaction. Practically every customer who is using a plant is eager to tell his friends about it and the many wonderful features it possesses. Many customers have told us that they would not take ten times what they paid for the plant if it were impossible to replace it. Many machines are purchased, experience shows, by persons who have watched the performance of their neighbors' refrigerators. It has been found, too, that prospects in general know much more about domestic refrigeration machines than they did two years ago. It has been found too that they are more familiar with prices, servicing facilities, and other important factors of that nature which make the merchandising of these appliances an easier task than formerly.

The missionary work is over, and the market now will respond to aggressive sales efforts, it is now felt.

At present there are approximately 33,000 residential customers on the system of The Washington Water Power Company. Of these, 24,500 are residents of Spokane. Although our investigations of electric refrigeration began in 1923, it was not until later in 1924 that the actual selling of plants began, following the placing of the 25 units on a trial basis. In spite of that, we closed 1924 with 34 sales.

Last year, 1925, with our sales efforts gaining headway, we were able to sell 103 domestic plants. And we do not hesitate to say at the present time that during the current year we will sell at least 250 plants.

In the smaller towns served by the company about 50 machines were sold last year, this in spite of the fact that only about half of the 24 principal towns served have had demonstrating machines available.

Turning the Trick with Three Form Letters and a Postcard

Dear Madam:

As one who lives in an up-to-date home, we naturally assume you would be interested in a new system of keeping foods pure and wholesome.

This system is convenient and regulated entirely by automatic electric control.

It is dependable; requires no watching or attention.

It is sanitary; producing a coldness that is crisp and dry.

It is reliable winter and summer; temperature is always the same.

It can be installed in any good ice box or refrigerator.

This system is "Correct Refrigeration," and "Correct Refrigeration" is produced by an ELECTRO-KOLD.

We would like to tell you more about the ELECTRO-KOLD for it is an interesting subject. If you wish to discuss the ELECTRO-KOLD with us, just write "YES" across the face of this letter and return it to us.

Very truly yours,

Dear Madam:

Inasmuch as electric refrigeration must be of interest to you, we are going to give you a little more information about an "ELECTRO-KOLD" than that given in our previous letter.

This wonderful system can be installed in any good refrigerator.

It maintains an uniformly cold, crisp, dry atmosphere that keeps foods in a perfect state of refrigeration.

Winter and summer—every hour of the day and night your refrigerator has the same intensely cold temperature.

In a special compartment ice cubes for table use and cooling drinks can be frozen. One of your greatest home keeping problems is now solved for you, that of having foods in a perfect state of refrigeration until you are ready to serve them to the family.

Would you like to have our "Home Refrigeration" man call upon you? Just write the date at the bottom of this leter and return it to us.

Very truly yours,

Dear Madam:

Surely there is something we have overlooked or failed to mention inasmuch as you have not replied to either of the two letters previously sent you in regard to "ELECTRO-KOLD," the new system of domestic refrigeration.

Probably we did not emphasize the fact that one of these little modern plants would soon pay for itself in the saving of food and at the same time, the health of the entire family would be safeguarded because all meats, fish, vegetables, fruit, butter, cream and milk are kept in a clean, wholesome and sanitary manner.

The above facts are very important, but "ELECTRO-KOLD" is a big and interesting subject, and we know there must be other information you would like to have. For this reason, we are enclosing a handy little post card which you can fill in, attach a two cent stamp, and drop in one of Uncle Sam's mail boxes.

Very truly yours,

ELECTRO-KOLD

I would like to know more about Electro-Kold, the New Automatic System of Correct Home Refrigeration.

Name_____

Address_____

Date to call_____

Nothing to Lose-Everything to Gain-Mail This Card NOW

Electric Refrigeration Offers Fertile Field for Contractor-Dealer

By D. D. McFarlane
Secretary-Treasurer, Newbery Electric Corporation, Los Angeles.

THE interest which is being created in electric refrigeration by the manufacturers and power companies should be capitalized by the contractor-dealer, in the opinion of the writer. In this article he outlines the successful plans followed out by his company, one of the pioneers to undertake the sale of electric refrigerators in southern California.

NO ELECTRIC appliance heretofore placed on the market has met with a more enthusiastic reception from the public than the electric refrigerator. The potential market for this household electric device offers opportunities which the electrical contractor-dealer or electragist canot overlook if he would realize all of the profits which his business affords. With the attention of the entire electrical industry centered on this appliance at the present moment it behooves the dealer to consider his responsibilities in the successful merchandising of electric refrigerators and shape his sales plans accordingly.

In shaping a sales program to cover this appliance the experience of the Newbery Electric Corporation may be of some help to other contractor-dealers. The plan followed by this company is one that any dealer might adopt.

The first problem which faced the company when it was decided to embark upon the sale of refrigerators early in 1925 was the question of advertising. It was decided to allot a certain amount for the initial advertising campaign, and the sum finally allocated was $5 per machine. Naturally this was an arbitrary amount as no machines had been sold. The company considered that ten refrigerators could be sold the first month so the initial advertising expenditure was $50. As sales have continued to increase since a start was made, the policy of spending $5 for advertising for each machine sold has been pursued. The manufacturer came to the assistance of the company and agreed to spend an equivalent amount for each machine shipped into the territory. This advertising now is appearing in southern California newspapers.

The second problem which faced the company at the start was the question of salesmen. As refrigerators were a comparatively new line there were no trained salesmen available. Inexperienced men were chosen and given a thorough schooling in electric refrigeration, with emphasis placed first on the necessity for refrigeration and second on the advantages and low cost of electric refrigeration. These salesmen were placed on a salary and commission basis and immediately placed in the field. The results have been very gratifying.

Among the first to be canvassed as prospects for the purchase of refrigerators were architects and home-building companies. Letters and circulars were sent to the majority of men of this class in the territory served by the company announcing the appointment of this firm as Electro-Kold dealers. Later salesmen called on some of the architects and builders for the purpose of selling them on the idea of specifying electric refrigeration in the homes they designed or built. At first this seemed like missionary work, but in a very short time the salesmen had more calls than they were able to take care of. In fact the inquiries increased at such a rate from week to week that additional salesmen were necessary. Building permits also were followed up as soon as issued by the building inspector, and many indvidual prospects were developed in this manner.

As an example of the success enjoyed in working with the home-building companies an instance may be cited where 91 machines were installed in a single block of homes. After considerable missionary work with the Birch O'Neal Construction Company this firm was induced to install machines in a few new homes it was building. Upon completion of the homes it was found that electric refrigerators in the homes furnished the salesmen with a strong argument for prospective purchasers. This experience resulted in an order for 91 machines which are being installed at the rate of ten per month in homes costing in the neighborhood of $12,000 to $15,000. The Birch O'Neal company recently has started another subdivision in Beverly Hills and is planning to install an electric refrigerator in each of the new homes to be constructed there. Advantage was taken of these installations further to advertise electric refrigeration. Each home and the entire block was placarded with the announcement that Electro-Kold refrigerators were installed.

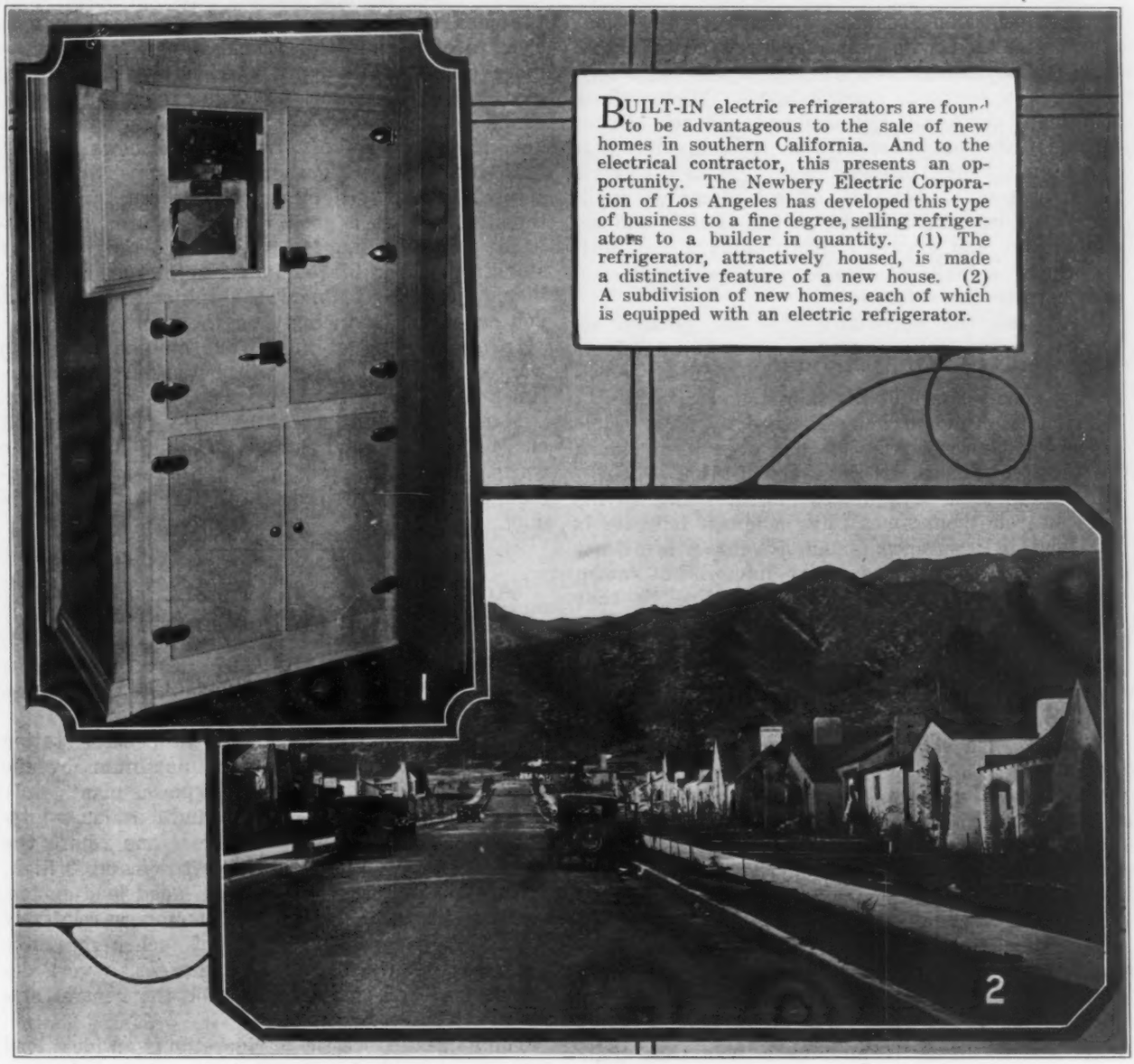
Apartment houses offer another field of large purchasers which the contractor-dealer may cultivate. If the argument is used that electric refrigerators constitute a strong inducement in renting apartments, little difficulty will be experienced

in selling the apartment-house owner on their installation at the time the apartment house is built.

The success experienced in following up building permits shows that not only the refrigerator itself will mean profitable business for the contractor-dealer but that it serves as a means of interesting the home-owner in additional electrical equipment. In one case recently handled by one of the firm's salesmen the contact established with the home-owner at the time an electric refrigerator was sold resulted in the sale of a complete installation of fixtures, a washing machine, an ironing machine, a radio set and a kitchen unit. Thus a sale which originally would have meant less than $1,000 was built up to a point where it resulted in the sale of merchandise and labor worth $4,000.

An additional argument in favor of the selling of electric refrigerators by the contractor-dealer is the question of servicing. While the refrigerator requires very little service work, when such service is required the man who does the work must be an experienced electrician and mechanic. This type of man usually can be found in the employ of an electrical contractor but seldom in a furniture or household furnishing goods establishment.

In the opinion of the writer the sale of electric refrigerators is a function of the contractor-dealer as well as the central station. With the public interest which is being created by the manufacturers and power companies through advertising and sales work keyed to a high pitch, the contractor-dealer or electragist who enters this field in an intelligent manner cannot help but prosper in proportion to the sales effort he expends.



BUILT-IN electric refrigerators are found to be advantageous to the sale of new homes in southern California. And to the electrical contractor, this presents an opportunity. The Newbery Electric Corporation of Los Angeles has developed this type of business to a fine degree, selling refrigerators to a builder in quantity. (1) The refrigerator, attractively housed, is made a distinctive feature of a new house. (2) A subdivision of new homes, each of which is equipped with an electric refrigerator.

Backseat Selling

A Salesman's Wife Answers the Question "Should the Wives of Utility Employees Take an Interest in Their Husband's Business?"

By Mrs. H. B. Rogers
Wife of the Spokane manager, Pacific States Electric Company

MISTER Man remarks about Mister Cloak Salesman's wife wearing nifty coats or remarks about Mister Electric Salesman's wife having such a complete electric home. Mister Cloak Salesman's wife will tell you and will tell all her friends just what make of coat it is, because that is the make her husband sells. Mister Electric Salesman's wife shows all of her electrical appliances, fixtures and so forth to her friends and acquaintances and always casually adds it is "Such and Such" a make of appliance and she will even demonstrate them for you.

For years the salesman's wife has created acceptance of her husband's wares, even taking orders and adding to the salesman's limited knowledge a goodly share of his sales talks.

Triple X brand of hams is used by Mrs. Triple X salesman's wife. And she has even been known to feed it to doubting Graces and Ediths.

A salesman always makes his first sale to his wife and she sometimes buys a lemon but she is not long in ignorance. Selling your wife is not such an easy task and cases have been known where a salesman has changed his line on that account.

Wives can be a wonderful help to all branches of industry. All of us have read lots of advertising to attract the women that had no value because some wife was not the proof reader.

Salesmen's wives take up a lot of time in conversations at little gatherings of women in exploiting their husband's merchandise and the funny thing, too, is that she holds an interested audience, creating an opinion that she is well versed on the subject, and generally she is. She receives telephone calls and personal visits, in regard to the hows and whys of that particular merchandise. Women are always proud of accomplishments and possess a vanity in knowing and doing as well as in personal appearance.

Salesmen do not fear their wives talking, their fears are confined, if any, to a fear that their wives will not talk. A successful salesman, nine times out of ten, possesses an exceptional salesman in his wife, a pair of salesmen, so to speak, Mr. Salesman and Mr. Salesman's wife.

"Why, Mrs. Smith, how you would enjoy an electric range, such an advantage over gas, just turn a switch, etc." All wives have heard that talk or a similar one and it always ends with something like this, "Now, you know my wonderful range." The answer is, Mr. Wonderful Range Salesman's wife is talking and when she is talking she is working and when she is working, she is in business with her husband.

Quite a few salesmen's wives are constantly in contact with their husband's business friends' wives and from them the wife picks her acquaintances and friends she carries through life, and very dear friends some of them become.

Women carry very little weight in soliciting votes to help elect a party if they solicit them from women to whom they are practically unknown. But let one woman sell her friend with the idea that a certain party is a good man to elect to office and this friend wants, and furthermore tries to sell another friend with the same idea. That idea working well cannot be beaten. Think for yourselves—it works in carrying scandal, and it works in carrying good news.

If you are in a gathering of women and subject is discussed in which your husband is interested, you as a good wife owe it to your husband to be willing to defend his interests by standing up for his business, to rectify any mistaken ideas and to know the subject so well that you can talk convincingly on the same.

In a gathering of men, your opinion is seldom wanted and if it is, it will be asked for, sometimes out of policy and on rare occasions, solicited.

Man is a funny creature. He places himself on a pedestal and stands exalted before the world. Nine times out of ten, there is some woman steadying the pedestal to keep it from tipping.

Advantages of Domestic Electric Refrigeration to the Central Station

By J. H. Cunningham*
Manager Central Supply Department, General Electric Company, Los Angeles.

THE most desirable load for the central station is one which will return the maximum revenue with the minimum investment in power plants, substations, distribution systems and similar equipment. A load of this character is one where the ratio of kilowatt hours to kilowatt demand is high, or in other words, a load with a good load factor. If, in addition to a good load factor, a relatively large proportion of the load is of such a character as to demand the higher rate charges, a very desirable state of affairs exists for the central stations.

The domestic electric refrigerator is an ideal load from this standpoint. Nearly all modern refrigerators are controlled automatically by thermostats or their equivalent so that the driving motor stops at varying intervals. The load curve of any individual machine will be a series of rectangles, and, as the number of machines on the system increases, this curve tends toward a straight line rising somewhat at meal times due to the greater number of door openings and consequent increased heat leakage.

The average power input of a domestic electric refrigerator is in the neighborhood of 250 watts, which is lower than most household appliances,

*From a recent address before the Los Angeles Electric Club.

but on the other hand the ratio of operating time to total time makes the power per kilowatt of demand extremely high.

With weather conditions as they exist in California, the motor of a refrigerator will run probably from six to eight hours a day, and on this basis its annual return in revenue is equal to that of 32 washing machines, 50 electric fans, 29 vacuum cleaners, or 11 electric irons. The annual revenue for each kilowatt of demand for the electric refrigerator is equal to the annual revenue for each kilowatt of demand for 53 waffle irons, 4 electric ranges, 36 toasters or 25 percolators.

The refrigerator does not add perceptibly to the demand of a power system and adds relatively little to its peak load. Therefore, a very large number can be added to the lines without any investment whatever in new equipment.

The Merchandising and Future of Electric Refrigeration

By L. D. Robertson*
Pacific Coast Sales Manager, Kelvinator Corporation, Los Angeles.

IT IS unnecessary to review the merchandising methods of the early days of this industry, except to say that it began like many other specialties in that it had to be nursed along like a delicate child and shielded from danger and disease that it might not die in its infancy. It has survived and is not only strong and healthy but at times threatens to break away from its parents. The exploitation of electric refrigeration could not be hurried. Those who tried that method failed. It has been a case of slow and careful development.

The industry is not so much interested in the past as in the present and future. What are the merchandising possibilities of electric refrigerators? Look for a moment at the history of some other specialties.

Look at the vacuum cleaner—twenty years ago a home that boasted one of those devices was exceptional. And the motor car—twenty years ago a rich man's toy, cursed by country people because it scared up their horses and kicked up dust.

Why have all these specialties become such huge business? Because of their convenience. Because they did a better job. Would you give up your motor cars, even if street cars were free? Would your wife give up her vacuum cleaner because brooms are still a dollar and a good cleaner costs $60? No! Because you and she have found out that those machines do a better job and are worth what they cost.

But it took time, work and advertising to educate the public.

The same public is just beginning to become educated to electric refrigeration. Even two years ago the idea had to be sold. Now it is a question of "which one?"

The chief sales resistance to electric refrigeration is price. Please mark this—The only ones who say an electric refrigerator is dear are those who do not have one. Those who have them would no more go back to old methods than you would take out your electric lights and burn gas or sell your motor cars and ride in a bus.

Most of these things cited cost much more than the methods which they replaced. Electric refrigeration is less expensive than the old-fashioned methods when saving of food, health and convenience all are considered, and as a dividend on the investment there are a hundred and one frozen dainties that can be made.

Let us "cash in" by using these advantages in our merchandising methods. Let us advertise. Let us tell the people the facts. And above all, when they trust us with their orders, let us not take advantage of their ignorance of our product but rather use our knowledge to supply them with what they should have.

Let our business methods be open and above board. Let competition be keen but clean. Let the service we render the purchaser be at least equal to our monetary gain, and the profit will be mutual.

Now, what of the future? Again let us look at a few examples of others' past that we may in a measure judge of our own future.

We well remember when Henry Ford announced that he would build ten thousand motor cars the next year, and now he is making upwards of six thousand every day. Or when Marconi sent his first dot-and-dash message without wires, who could have imagined the radio business of the past year?

Manufacturers of electric refrigerating machines made and sold four times as many machines in 1925 as in all previous years added together, and it is estimated that 1926 will see five times as many built as in 1925.

Our field for household machines is limited only by the supply of current, and high lines are reaching out everywhere. Ice-cream-cabinet business has only begun. Other fields remain untouched, such as restaurants, grocery stores, refrigerated show cases and the like.

Milk used to be hauled about in tin cans and doled out to customers with a dipper. Today it is delivered in sanitary bottles. The milk wagon of the future will be refrigerated electrically.

The refrigerated railroad car of the future will be kept cold by the turning of the wheels on which it rolls just as Pullmans are lighted today. Every passenger train will have its refrigerating plant.

It will take ten or twenty years to work our present field. By that time the demand will have increased to an unbelievable extent. Moreover, the present machines will be worn out or out of date, then and the same field will have to be supplied again.

This is not an idle dream. It has happened in many other lines, and it will be repeated with electric refrigeration.

*From a recent address before the Los Angeles Electric Club.

Local Developments in Motor-Driven Pumps for Underground Work*

Where it is impossible to make proper sewer connections to protect the underground equipment and to enable workmen to enter vaults in connection with underground circuits, it is necessary to remove the water at certain intervals.

The first method employed was the use of ordinary buckets, with a piece of rope attached, (Fig. 1-a) to lift the water from the hole and dump it on the street. Allowed to seep away as best it could it left the street in a dirty condition. Another early method used was a hand pump. This was a diaphragm pump and was very successful. (Fig. 1-b.) These methods were possible in the days when the manholes were small and traffic on the street light.

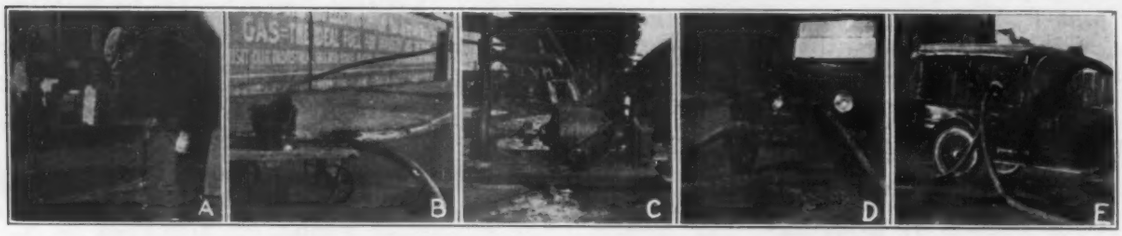


Fig. 1.—Evolution of manhole pumping: (a) old bucket-and-rope method; (b) hand pump; (c) portable electric motor-driven centrifugal pump; (d) centrifugal pump mounted on frame of car and driven by car engine; (e) gear pump in action, driven by car engine.

However, conditions have changed and now it is necessary to build larger vaults and when cleaning them, in most instances, to convey the water to a cesspool or to gutter. In some cases where there is much mud deposited in the hole it is necessary to haul it away.

This can be accomplished easily and quickly by using a power-driven pump with a discharge hose. The pump can be driven by an electric motor or a gas engine, (Fig. 1-c). The electric motor may be operated from an electric truck or directly from the distribution lines. However, the latter is not good practice for emergency work as connections cannot be made when the vault is filled with water. The electric-driven pump can be used to good advantage, however, in the construction of conduit lines where it is necessary to drain the excavation while the duct is being installed. A type of pump which has proved very satisfactory for pumping out vaults is one designed for attachment to certain standard makes of motor cars and using a simple power take-off from the motive power of the car, Fig. 1-d.

This pump is the centrifugal type, well constructed, and is attached to the front end of the frame of the car in line with the crankshaft. The weight of the pump therefore is carried on the frame, and none of the weight or strain is carried by the crankshaft or motor. The pump is driven by a floating shaft from the motor. A small hand clutch is used to disengage the power unit while moving the car and pump can be left in position without strain or damage to the car or pump. The entire equipment can be installed in about two hours. The pump itself can be removed from the hanger by removing three cap screws and may be carried in the body of the machine if necessary. This operation should not exceed three or four minutes' time.

These pumps can be obtained in 2½ or 3-in. sizes, using 3 or 3½-in. suction hose, respectively, and will lift water over 20 ft. with a discharge capacity of from 200 to 250 gal. per min. for the 2½-in. size and about 300 gal. per min. for the 3-in. size, at an engine speed corresponding to about an 18-mi.-per-hr. driving speed. This pumping outfit is one that can be transported quickly and economically from one location to another with a minimum loss of time. Automatic primers can be installed and are very convenient. The vacuum which operates the primer is taken from the intake manifold of the motor. Small sticks, mud ang gravel readily will pass through without serious injury to the pump.

Very satisfactory results have been obtained with a unit consisting of a Dodge screen body truck on which is mounted a gear pump driven by a power take-off from the truck-engine, Fig. 1-e. This pump is one of high efficiency, having only two moving parts and with a lift of better than 20 ft. The pump has a capacity of 100 gal. per min. operating at about 250 r.p.m. To date no difficulty has been encountered from clogging or damaging the pump with foreign matter which often is picked from the vaults.

An inexpensive and useful pumping unit can be assembled and has been used very successfully. This consists of a rotary pump driven by any standard power take-off. This is ideal equipment, for these pumps have a positive suction and therefore need not be primed. They are small in size, simple in construction, strong and durable, and when damaged can easily and quickly be repaired. They are made in various sizes, and although the lift is not as great as that of the centrifugal pump, they will pick up the water readily at 15 ft. without priming.

Where it is inadvisable to install pumping equipment on a machine a trailer can be used. For hand work the diaphragm pump is the most successful. When a power unit is desired any of the types of pumps previously mentioned may be equipped with a gas engine and the complete unit installed on a trailer. These units are found to be very useful and do not tie up transportation equipment where there is little moving required and large quantities of water are to be pumped at once location.

Experience has taught that the Ford standard chassis is too light for use in cleaning manholes where much mud accumulation exists, for it is very easy to overload the equipment. Therefore machines such as Ford trucks, Ford dump, Dodge trucks, or cars of this type give longer and more efficient serv-

Fig. 2.—Permanent installation of gear pump in Dodge screen-body truck.

*Serial Report, Underground Systems Committee, Pacific Coast Electrical Association. P. E. Chapman, Pacific Gas and Electric Company, Chairman. Report prepared by R. P. Lutzi, Pacific Gas and Electric Company, member of Underground Systems Committee.

ice where the class of work demands it. Larger quantities of mud can be handled at one time and this item is worth consideration where it is necessary for a long haul to a convenient dump. The possible damage to the lighter machine from overloading also should be considered.

It is essential to use foot valves with all types of pumps as the suction is held much better, and there is less chance for clogging or damaging the pump with foreign matter which may be in the vault.

For choosing equipment due consideration should be given to the class of work to be done. Then the type of unit best suited for that particular work should be selected, not overlooking the fact that durability and simplicity are the essentials that keep the equipment on the job at all times.

Cement Duct—Analysis of Chemical Actions on Lead Cable*

Portland cement on the market has the approximate composition of

Si O_2	22
Al_2 O_3	7
Fe_2 O_3	3
Ca 0	62
Mgo	3
SO_3	2
Alkalies)	
Water)	1
CO_2)	
	100

and mainly is a solid solution of lime, silica and alumina; the latter referred to as alite. The setting of wetted cement appears to be the joint effect of several different actions not yet clearly understood. The main reaction probably is the formation of colloidal calcium alumino-silicates. These decompose, forming crystals of tricalcium aluminate and a number of other substances in a colloidal condition.

Concrete made from standard Portland cements and the filler ingredients should show no large soluble proportion; the bulk of soluble material is in the form of calcium hydroxide. This substance is strongly alkaline and acts under certain conditions as does any other base. Exposed to air, calcium hydroxide soon is converted into calcium carbonate, insoluble in water and crystalline enough to fill in as a strong binder.

The action of calcium hydroxide on metallic lead is not understood clearly at present, but under some conditions lead hydroxide is formed which is soluble in an excess of the alkali, forming plumbites such as Pb (0 Ca 0). Lead oxidizes superficially in air first forming suboxide Pb_2O. This substance in the presence of soluble carbonates renders the protectine coating of insoluble lead (basic) carbonate. Free, moist CO_2 in contact with lead gives the soluble (acid) carbonate. The sample of concrete duct under observation showed no free magnesium, but a small amount of free lime. Determination of this free lime was made as follows: 25 g. of sample were ground, leached, filtered, washed and diluted to 250 cc. A 25-cc. sample required 1.35 cc. N/10 H_2 SO_4 to neutralize, which represents 0.0050 g. of Ca $(OH)_2$ or 0.0038 g. of CaO in a 2.5 g. sample, or, in percentage, 0.20 per cent free Ca $(OH)_2$ or 0.15 per cent free CaO. This amount probably would be much greater in freshly made duct and considerably less in well aged duct. And in time all free Ca $(OH)_2$ and CaO would be converted into the insoluble $CaCO_3$.

Even if this percentage of lime did persist in the duct and the reaction with lead were permitted to go on to completion, the lead involved would be so slight as to be negligible.

A specimen of lead cable was immersed in the above strength of lime solution for 12 days without any indication of action, and in an analysis no lead appeared in the solution. Where the cable was in contact with the solution, however, there was a slight darkening of the metal, probably due to the formation of one of the lower oxides which would eventually pass to the insoluble basic carbonate.

*Supplemental Report, Underground Systems Committee, Pacific Coast Electrical Association. P. E. Chapman, Pacific Gas and Electric Company, Chairman. Cement duct subcommittee: H. H. Buell, chairman; H. C. Moyer, R. P. Lutzi, all of Pacific Gas and Electric Company.

Low-Cost High-Tension Metering for Operating Purposes*

Last year's subcommittee covered the investigation of oil-insulated and bushing current transformers available for this class of metering. This year the subcommittee investigated the use of air-insulated transformers. A Niagara transformer, manufactured by the Niagara Electric Improvement Company, was tested for ratio and phase angle under a variety of conditions.

The transformer tested was selected at random from a shipment of six similar transformers, the name plate data of which were as follows:

Rated Voltage—66 kv.
Amp. Primary—200/400.
Amp. Secondary—5.
Nominal Ratio—49-80/1.
Frequency—50 cycles.

Results are given in Table I.

This transformer has several interesting features not usually found in current transformers, in addition to its unique shape and method of insulation. The primary winding has connected in parallel with it a shunting resistance the adjustment of which makes it possible to shift the phase-angle curve with reference to the zero axis. The core has wound upon it a tertiary winding consisting of about 50 turns of No. 18 bare resistance wire short circuited on itself. This also is for the purpose of adjusting the position of the phase-angle curve. The secondary winding has two taps for adjustment of ratio error; one of these, the full winding, has 399 turns; the other has two turns less or 397 turns. The ratio and phase angle were determined by means of a Leeds Northrup-Silsbee current transformer testing set.

Table I—Tests on air-insulated current transformers.

Test No.	Burden	Volt-amp.	Ratio Error		Phase Angle	
			100 per cent load	10 per cent load	100 per cent load	10 per cent load
					(min. of angle)	
1.	4-12-amp. CR relay on 5-amp. tap; SY ammeter, 5-amp.	20	1.000	1.0025	—22	—13
2.	4-12-amp. CO relay on 10-amp tap; SY ammeter, 5-amp.	10	0.997	0.999	—20	—13
3.	Weston model 155, 5-amp. ammeter		0.9955	0.9955	—20	—10
4.	Weston 155, 5-amp. ammeter; Weston 310, 5-amp. wattmeter; G.E. IB-6 5-amp. test meter....		0.996	0.996	+9	—10
5.	10 volt-amp. at 0.9 p.f., full secondary winding. Primary Shunt Resistance 10 ohms		0.9965	0.9958	—37	—29
	Infinite		0.9960	0.9944	—18	—10
	Change in Correction..		0.0005	0.0014	+19	+19

The first four of the above tests were made with the full secondary winding of the transformer and with 33 ohms in the primary shunt. The effect of changing the primary shunt is indicated in item 5.

The effect of stray fields on this class of transformer was tested. The primary connection leads were placed 1 ft. from the primary winding. The influence of the current in the primary connecting lead caused a change in the ratio curve of approximately 1 per cent at 0.5 and 0.7 per cent at 5 amp. with but a variation of 3 min. in the position of the phase-angle curve.

From these results it is apparent that this transformer is sufficiently accurate for metering purposes.

*Serial Report of the Meter Committee, P.C.E.A. R. G. Jones, The Southern Sierras Power Company, Chairman. Report prepared by W. N. Lindblad, Pacific Gas and Electric Company, and L. L. Conrad, Southern California Edison Company.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

Plant Additions Necessitate Line Reconstruction

Few Replacements and Little Tower Reinforcing Needed to Recondition 60-kv. Line After 14 Years.

By A. Vilstrup, Assistant Engineer, Electrical Engineering Department, British Columbia Electric Railway Company, Ltd., Vancouver.

Increase in the generating capacity of the Stave Falls hydro plant of the British Columbia Electric Railway Company, Ltd., and the company's other developments on the Stave River necessitated the reconstruction of one of the company's main transmission lines. The line in question is about 32 miles long, of double-circuit construction, and operates at 60 kv. It is an important link in the transmission system on the lower mainland of British Columbia connecting the Stave Falls plant with the principal load center in Vancouver.

Original construction of the line was by the Western Power Company of Canada in 1911. Until the summer of 1925 the original No. 0 stranded copper conductors of the line were sufficient. The replacing conductors are 300,000 circ. mil stranded copper. This obviously is more than required for the present, but will take care of the future developments in the Stave section.

New insulators also were installed throughout the length of the line at the time that the line was rebuilt. Certain operating troubles were reduced materially by increasing the number of insulator units from 3 to 4 in suspension strings and from 4 to 5 in strain and semi-anchor strings. All insulator units are Canadian Porcelain Company 10-in. disks.

Existing steel towers were reinforced where necessary to care for the increased mechanical loading. In a few instances an intermediate tower was installed to reduce the length of a span. These spans wherein intermediate towers were installed were those where the clearance to ground or to other circuits crossing beneath could be maintained with the original tower spacing. At two points where the line makes abrupt angles the original steel towers were replaced by twin-pole (wood) corner structures, heavily guyed. At two other locations wooden A-frames were erected to take care of dead-ending the conductors. Figs. 1 and 2 show typical examples of this wood construction.

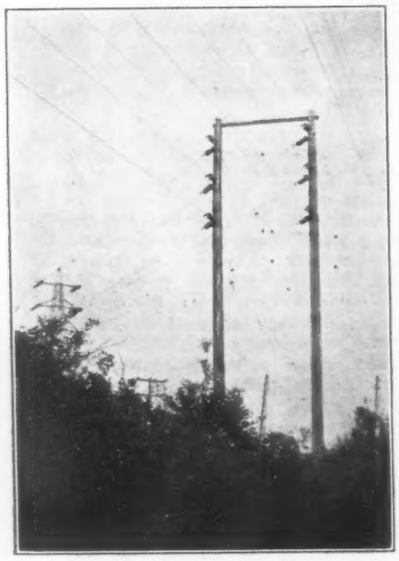


Fig. 1.—Special 2-pole corner tower.

In stringing the heavier conductors and still maintaining the necessary clearance between the lowest conductor and ground it was necessary to employ greater stringing tension than had been used for the lighter conductors initially installed. Apart from the special care which had to be taken during the stringing operations to avoid the buckling of crossarms and otherwise injuring the towers, this condition did not affect greatly the ordinary suspension towers on straight line sections over flat ground. The greatest trouble was experienced where the line makes sharp turns either vertically or horizontally. Fortunately there were not many of these locations and the worst were taken care of by the wooden A-frames and the 2-pole structures already mentioned. Smaller angles were dealt with by reinforcing the existing towers, chiefly by installing heavier crossarms and suitable guying as shown in Fig. 3. However, local conditions in each case were studied and prescribed for. The installation of heavy guys normal to the line could not always be made conveniently, necessitating dead-ends in some instances. In these cases the conductors were strung slack around a corner.

The number of dead-ends on the line was reduced to a minimum, but semi-anchoring of the conductors at regular intervals was followed consistently, usually every fourth tower. This construction was resorted to with a view to overcoming a tendency toward unequal wire sag under severe snow conditions. Trouble from this cause had been experienced on this line in the past. Fig. 4 shows a typical section of line, semi-anchor tower in the foreground.

Average spacing of the line towers is 550 ft. where the line follows a public highway. Where the line traverses private rights-of-way and where a lower clearance to ground is permissible the average span is 660 ft. Ground depressions in many cases permitted longer than normal spans.

While the foregoing in the main covers the transmission reconstruction, certain special features were involved at the Pitt River crossing. This crossing involves a single span of 1,360 ft., both circuits carried on one pair of towers. As this span is too long to permit the use of copper conductors within available sag limits, copper-weld steel cables ⅝-in. in diam. replaced original ½-in. galvanized steel cables. Tower structures at this crossing consist of a 160-ft. tower on each bank of the river and a rocker-tower on which the conductors are dead-ended. These rocker-towers are guyed heavily to concrete anchors buried in the ground. These two types of towers are shown in Figs. 5 and 6, respectively.

On the main towers the conductors are supported on sheaves suspended from double insulator strings mounted on suitable yokes. The upper two conductors are carried on a double set of 3-sheave supports, the details of which are shown in Fig. 7. This type of support was used to gain vertical clearance between conductors and adjacent lower crossarms. The lower conductor of each line is carried on a double set of single sheave support as indicated in Fig. 8.

At the rocker towers the span conductors served around 14-in. sheaves attached to the towers by an arrangement of strain insulators and yokes similar to that used on the main river-crossing towers. Heavy 4-

Fig. 2.—Special A-frame dead-end.

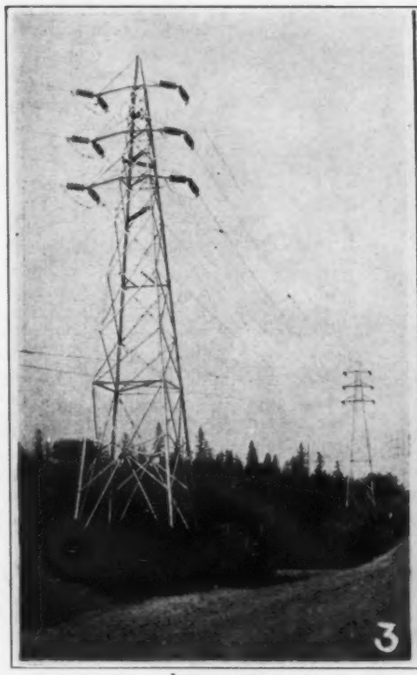


Fig. 3.—Strain tower for angle positions; heavier material than standard.

Fig. 4.—Semi-dead-end construction on standard tower.

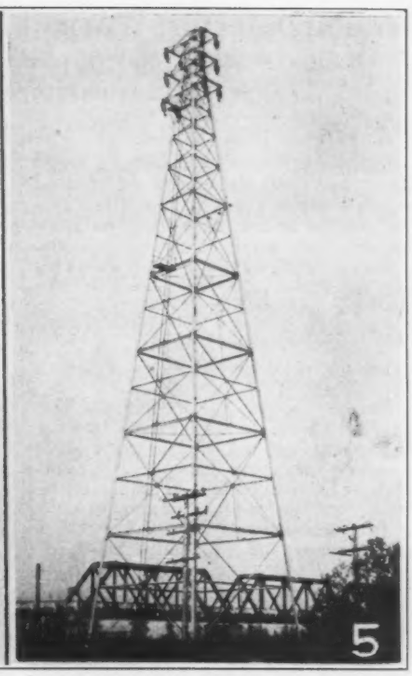


Fig. 5.—Main tower west bank Pitt River; 160 ft. high, carries 2 lines.

bolt clamps with babbitt-lined parallel grooves are used to secure the copper-weld conductors. All of the sheaves used are bronze-bushed and able to turn freely, the groove of the sheave is carefully machined to remove any roughness in the casting which might injure the copper sheathing of the conductor cables. In reconstructing the crossing it was possible through the use of copper-weld cable, to keep within the stresses for which the towers were designed originally.

One more noteworthy feature in connection with the reconstruction was the necessity for interfering as little as possible with the operation of the transmission line during the reconstruction period. Naturally this affected the working methods and, to some extent, the selection of materials for reinforcing the towers that needed reinforcing. As far as possible only one circuit was touched at any one time. However, during working hours both circuits were kept out of serivec; the one not being worked on kept in readiness for emergency service on short notice. At the end of the working day this circuit invariably was energized and maintained in normal service until work began the following morning.

Reconstruction work was carried on by the company's own line department, with four gangs employed simultaneously on as many sections of the line during the greater portion of the time. No mishap or loss of time occurred during the length of the job, either from operating contingencies or other causes.

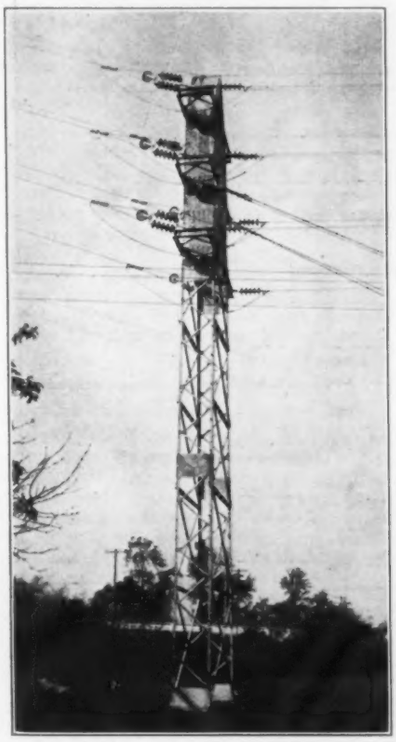


Fig. 6.—Anchor tower for Pitt River crossing span of 1,360 ft.

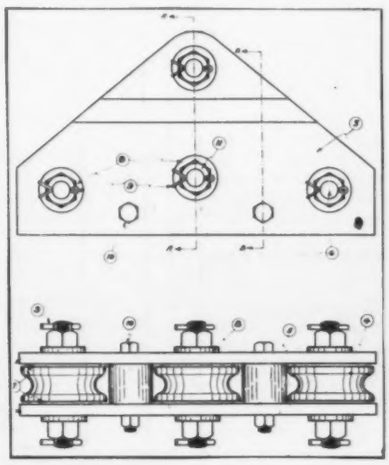


Fig. 7.—Details of 3-sheave conductor support for Pitt River crossing.

Did You Know?

One ounce of gold pays wages for—

Twenty hours' work in the United States;

Fifty hours' work in Great Britain;

Ninety hours' work in Japan;

One hundred hours' work in France;

Two hundred hours' work in Germany.

This means that Americans must maintain their past record for high output per man to guarantee the prosperity which will mean steady jobs for all.

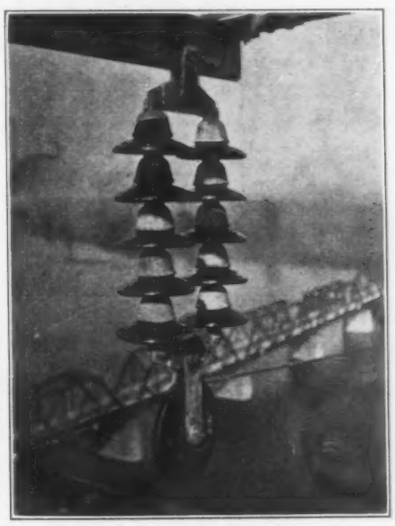


Fig. 8.—Single-sheave conductor support for Pitt River crossing.

Ground Detectors Warn of Dangerous Conditions--II

Design Features and Operating Characteristics of Various Types of Instruments Outlined and Compared

By L. F. Hunt, Development Engineer, Southern California Edison Company, Los Angeles.

Details of the Armstrong, voltmeter, and hot-wire types of ground detectors were given in the first section of this article, appearing on page 262 of the April 1 issue of the Journal of Electricity. The two remaining types are discussed in the following paragraphs:

Potential Type*

The potential-type ground detector consists of a voltmeter and relay combination as shown in Fig. 7. The voltmeter scale is calibrated directly in per-cent ground, from 0 to 100. Thus the voltmeter becomes a ground indicator showing the degree of intensity of the fault; for no ground the instrument reads zero and for full ground reads 100 per cent. The relay is a Westinghouse type CV calibrated to close its contacts when the ground intensity exceeds 10 per cent. Closure of the relay contacts sounds the alarm bell. On the rear of the panel are mounted a bell-ringing transformer and the alarm bell.

The ground detector is connected across the open delta of a star-delta bank of three potential transformers as shown in Fig. 8. The relay and meter are in parallel, the bell circuit energized from any convenient 110-volt source through the bell-ringing transformer. Relay contacts control the circuit of the high side of the bell-ringing transformer, the low side being connected directly to the bell. The reason for this particular connection is that it imposes a lower current-interrupting duty upon the relay contacts and, further, does not keep the transformer energized. The knife switch opens the circuit of the operating coil of the relay. This provides a satisfactory control of the ringing of the bell in cases of trouble. The push-button shorts out the voltmeter resistance permitting a 10-to-1 scale deflection for a very small ground. It is used for checking purposes only when the instrument indicates less than 10 per cent ground.

When a ground occurs the voltage from line to ground is reduced, unbalancing the 3-phase voltage and causing the unbalanced voltage to appear across the open delta of the potential transformer secondaries. This voltage acts upon the instrument which gives a direct indication of the ground intensity. For grounds of less than 10 per cent a very accurate reading can be obtained by depressing the push-button as previously mentioned. If the button is used when the bell rings, or when the indication shows a ground of more than 10 per cent, damage to the instrument is likely to result.

The advantages of this type of ground detector are that it gives a very definite reading in a tangible method; it is very accurate; it is fool-proof; it indicates the slightest ground conveniently. Its disadvantages are that it does not show which phase may be in trouble; it requires three potential transformers.

*Patent pending.

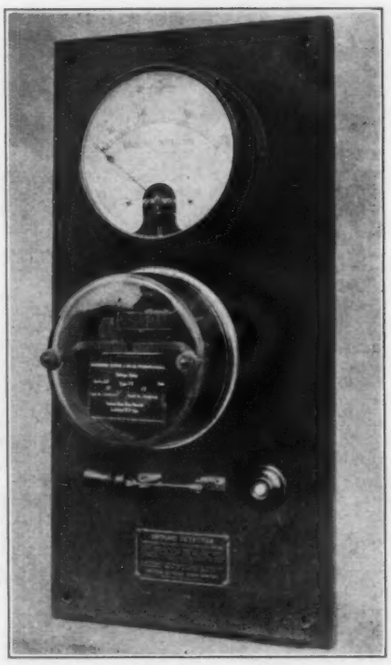


Fig. 7.—Potential type ground detector.

Vectors are as shown in Fig. 2. Under normal conditions and without a ground on the system the vectors (ft) show normal phase relations; WZ=0, therefore no meter indication. Conditions for full ground on C phase (center) shows the voltage across C transformer to be zero and the resulting changes in secondary voltages; WZ=190, causing the meter to indicate 100 per cent ground. A ground on C phase causing the volt-

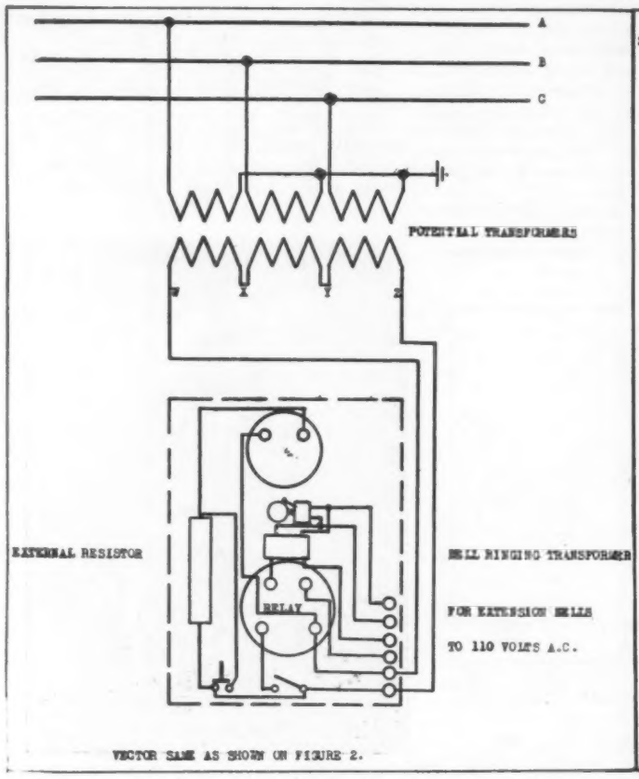


Fig. 8.—Wiring diagram for potential type ground detector.

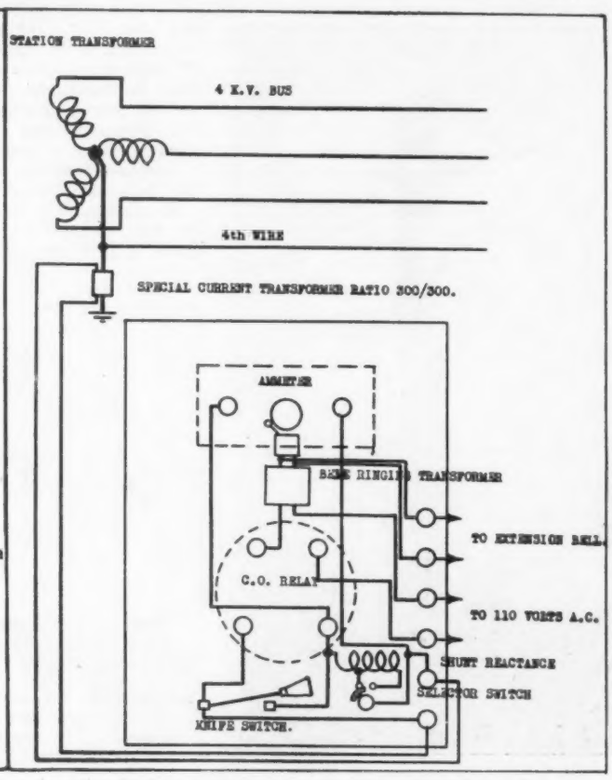


Fig. 9.—Wiring diagram for current type ground detector.

age of that phase to ground to be reduced half gives the results shown (right); WZ=95 volts, causing detector to indicate 50-per-cent ground. In other words, the meter indicates grounds in proportion to the phase-voltage drop (to ground).

This type is used practically exclusively on the Southern California Edison Company's system, superseding older types.

Current Type

Later developments of distribution systems include a 4-kv., 4-wire grounded-neutral system. In this system the substation transformer bank is star-connected on the low side, the neutral solidly grounded. However, it is possible to have a case of trouble, such as a wire down on dry earth or on pavement, without causing a kick-out of the breaker controlling the circuit. Some means had to be devised to ascertain conditions when lines are grounded by faults.

Voltage changes as used in previously described ground detectors will not serve here because the neutral is grounded and no voltage change will result from slight grounds. The only available method is the use of a current-measuring device. The apparatus made up consists of a low-energy over-current relay, a sensitive ammeter with a heavy shunt reactance, bell alarm and current transformer of special ratio, 300/300.

Electrical connections are as shown in Fig. 9. As indicated, the special current transformer is connected in the grounded neutral lead from the station transformer bank, thus catching all ground currents returning thereto. The general appearance of the complete instrument is quite similar to that of the potential type.

In this scheme it is imperative to leave off all transformer and neutral grounds, with the exception of the neutral ground of the main bank which goes through the special current transformer actuating the detector.

When any line becomes grounded the ground return current must pass through the ground-detector current-transformer, thus indicating on the ammeter of the detector. The normal range of the ammeter is from 0 to 100 amp. The relay will close its contacts, causing the alarm bell to ring, when ground currents of 1 or 2 amp. flow. This value may be adjusted by changing the tap-screw in the relay. Closure of the knife switch will stop the bell in case it is ringing or prevent its ringing by shorting out the operating coil of the relay. If the ground is of especially low intensity a sensitive reading may be obtained by manipulation of the scale switch. This switch cuts in more reactance in such a ratio that the range of the scale is changed to 0-to-10 amp. The second step of this switch gives a scale range of 0-to-1 amp. With this selection of scale ranges, through the manipulation of a switch, accurate readings of ground currents varying anywhere from 0 to 100 amp. may be obtained.

The special current transformer is made with a very heavy primary so as to have a copper cross-section as large as the conductors leading to it. The ratio of 300/300 is to represent this fact. In transformers used the primary has copper equivalent to 4/0 copper wire.

The very sensitive ammeter arrangement is necessary because many grounds appear that dry off to a high resistance in a short time due to the current flow. Consequently the current flow conceivably might drop to very low values requiring all of the flexibility provided in this instrument.

The major advantage to this type of instrument is that it will measure slight grounds without being affected by inbalanced currents. Its disadvantage is that it requires several special pieces of apparatus.

Single Vault Serves Eighteen Blocks of Street Lights

By W. C. Foster, Assistant Operating Engineer, Portland Electric Power Company.

Eighteen blocks of new street-lighting system were placed in operation in Portland, Ore., in November. This system extends along Broadway from the Broadway bridge south to Jefferson Street. Six Union Metal standards are used per block. Each standard carries 2 G. E. Novalux units with rippled medium alabaster globes and canopies and fitted with 20-amp. 15,000-lumen (1,500-cp.) lamps. The light center is 19 ft. above the street and the 98-ft. spacing between pairs of standards in the block and 65-ft. spacing between pairs of standards at street intersections gives an average of 8.66 lumens per sq. ft. on the street.

The system is divided into 6 circuits, each circuit being fed by a 40-kw., 6.6-amp. constant-current transformer. These transformers are operated 2 in parallel on a 2.4-kv. primary, each pair connected from one leg to neutral on a 4.5-kv., Y-connected distribution feeder. One transformer of each parallel pair feeds a lamp circuit north from, and the other transformer feeds a lamp circuit south, from Stark Street. This makes a total of 3 circuits each way from this main vault as indicated in Fig. 2.

North and south circuits feeding from one pair of transformers supply standards at northeast and southwest corners of street intersections. A second pair supplies the northwest and southeast corners at street intersections. Standards in the centers of the blocks are supplied from a third pair of transformers.

Control of the 4.5-kv. feeder is from the substation at Broadway and Alder Streets. An oil switch on each leg of the feeder controls one pair of transformers and consequently controls one north and south circuit. Through this control two sections in each direction are cut out at 1 a.m., leaving in service one circuit in each direction for all-night lights. This latter includes a pair of lamps, diagonally opposite, at each intersection, totaling 37 out of the 106 standards for all-night service.

Distribution from constant-current transformers to lamp standards is by

Fig. 1.—Portland's new lighting standard.

means of No. 8 solid, single-conductor armored parkway cable designed for service at 5 kv., 60 cycles. The cable enters the base of each lamp standard where it is controlled by a Westinghouse disconnecting pothead. From the pothead the connection is through a Westinghouse series transformer to the lamp. The series transformer changes the high-voltage 6.6-amp. current to 20-amp. at lower voltage. This transformer has 2 secondary windings, one for each lamp, and will operate satisfactorily even with both lamps out. Any standard may be disconnected from the circuit by means of the pothead without interrupting service to the remainder of the circuit.

The Broadway lighting system cost property owners about $50,000 for installation. In addition to this the maintenance charge covering energy consumed, lamp renewals, cleaning and painting, replacements and other incidentals for a 5-year period will amount to about $12 per month per standard.

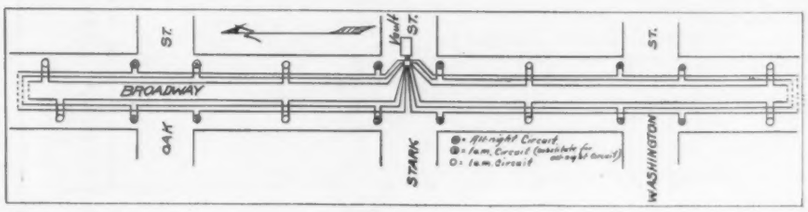


Fig. 2.—Schematic diagram indicating the single-vault circuit control for Portland's Broadway lighting system.

IDEAS FOR THE CONTRACTOR

Answering the Query, "Why So Many Switches?"

Based on Fundamentals of Power-Distribution Systems in Industrial Plants Using Central Station Power

"Why so many switches?" is the question invariably asked when the manager of an industrial plant looks at the wiring plans of a modern electrical layout. To begin with, the electrical layout of an industrial plant should be based on a careful study of the present and future requirements of installation. No two plants are identical, and different solutions of the problems presented are necessary. There is no attempt in this article to cover the entire field, but merely to point out a few fundamentals. A typical plant will be assumed of, say 50 to 500 hp., using 220-volt, 3-phase, 60-cycle power, with a rigid metal conduit system and standard fittings, externally operated safety switches, motor control apparatus, etc.

Referring to Fig. 1 as an example, an analysis will be made of the transmission of power from the power-company lines to the customer's 10-hp. motor. Note there are four switches in this layout—three fused switches and a motor control device. The function of each is as follows:

I. Main service switch—600 amp. (a) Connects and disconnects power company to main switchboard. (b) Fuses protect power company and customer against hazards due to total plant overload and short circuits.

II. Branch switch—200 amp. (a) Connects and disconnects individual feeders without disturbing balance of plant. (b) Fuses protect bus from hazards due to total overload on sub-feed short circuits.

III. Circuit switch—60 amp. (a) Connects and disconnects individual motor circuit without disturbing balance of plant, permitting work on motor or motor control device. (b) Fuses protect sub-feed bus from hazards due to heavy sustained overloads or short circuits which cannot be handled by overload relay of motor control device. They will not open on usual motor starting currents.

IV. Motor control device—(a) Acts as motor controller for frequent operation—an inherent part of a complete motor equipment. (b) Provides running overload and under voltage protection to motor—the only switch giving true protection to the motor itself.

From this enumeration it readily may be seen that each switch has a definite and worth-while function to perform, and cannot in any sense be considered as unnecessary in any plant where safe and flexible electrical installation is desired. It should be noted in particular that a motor circuit always has at least three parts: (a) the circuit switch; (b) the motor control device, and (c) the motor.

Wiring viewed from this angle becomes a job for industrial electrical specialists—not an odd-moment task for a helper. It is a vital element in the operation and safety of the whole plant, and should represent an investment in proportion to its importance.

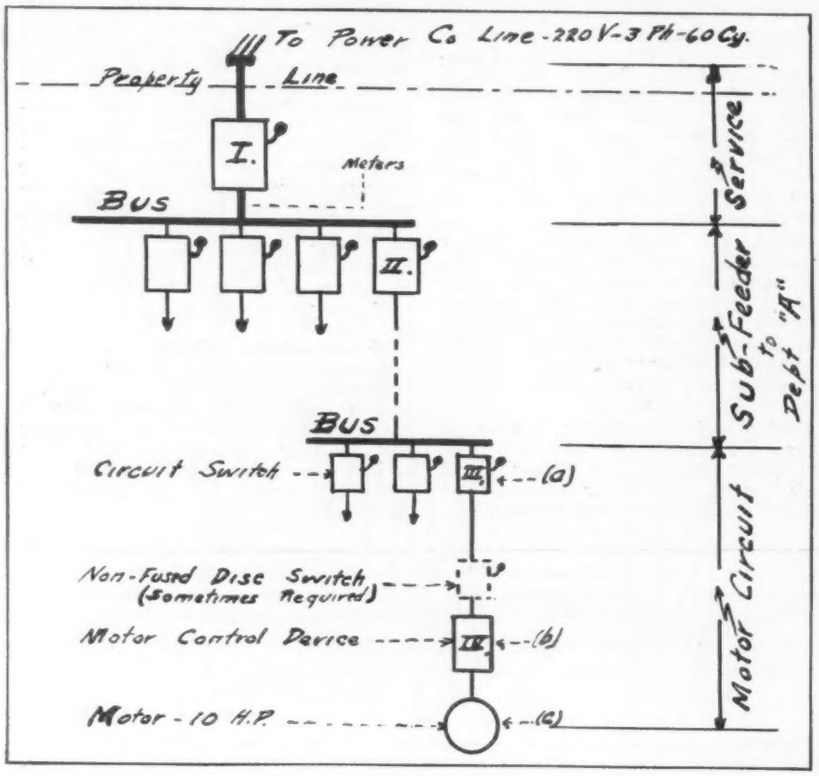


Fig. 1.

Why Two Codes?

(Contributed.)

Wherever the Uniform Electrical Ordinance has been presented, this question has been asked—Why Two Codes? Why does this ordinance contain the National Electrical Code and the National Electrical Safety Code? When it was decided to prepare a Uniform Electrical Ordinance, why were not the provisions of both these codes incorporated into a single code? Does not this situation entail needless complications?

While simplification is generally desirable, it is not always practicable, and this is the case with the two codes which govern electrical equipment and installation.

The National Electrical Code is a fire code. Its provisions and regulations have been drawn with the sole object of reducing fire hazard.

The National Electrical Safety Code is a casualty code and is designed primarily to reduce injury and loss of life to human beings.

Because of its character, the fire code admits of definite fixed rules, and inspections under it can be conducted by rigidly applying these rules.

The casualty code, on the other hand, admits of no such definition. A piece of electrical apparatus may be regarded as safe when placed in a given location, or so arranged that only expert electricians have access to it, but it may be considered highly hazardous when placed somewhere else, or accessible to the general public. Hence inspections under the casualty code must consider location and accessibility and must depend to a considerable extent on the judgment of the inspector.

For those reasons the two codes and inspections under them must be kept separate.

The National Electrical Code was drawn up originally in 1897 by the National Conference on Standard Electric Rules, a body composed of insurance, electrical, architectural and allied interests. Since the disbanding of this conference the code has been in charge of the National Fire Protection Association. The Association periodically revises the code to meet requirements of electrical progress, each revision being published by the National Board of Fire Underwriters and distributed to those interested and concerned with its application.

The National Electrical Safety Code was promulgated by the U. S. Bureau of Standards and first published in 1914. Its mission was to guide legislative bodies in preparing regulations covering public safety, especially with reference to workmen's compensation laws.

Nationalizing the Two Codes

When the Uniform Electrical Ordinance was prepared by the Electrical Manufacturers Council, the excellence of the two existing codes was recognized. It was planned to incorporate them bodily into the new ordinance, but certain limitations of the two codes prevented this. Before they could be made generally applicable, it was necessary to nationalize them and so draw them as to serve all affected interests—the public, the insurance companies, the builders, and the electrical industry as a whole.

This nationalization was effected by having the two codes approved by the American Engineering Standards Committee. The function of this committee is to see that all parties at interest have been represented properly in the preparation of proposed standards, and to signify, by its approval, that the proposed standards are fitted for nation-wide acceptance.

After revisions of both codes by their sponsors and after due investigation and consideration by various subcommittees and the American Engineering Standards Committee itself, both codes received formal approval and were inserted in the Uniform Electrical Ordinance.

Modifying the Codes

Through A.E.S.C. procedure provisions have been made for revision of these codes as the necessity arises. A revision of either code can be accomplished in about one year, the shortest time in which it is considered advisable that a change having such country-wide application should be made.

The State of Washington, W. B. Wilder, state architect, Olympia, will call for bids shortly for installation of electrically operated vote-recording machines and page calls for both house and senate chambers. The two installations will cost $42,500.

The Electric Bulb & Appliance Company, 843 E. Washington Street, Pasadena, Calif., has been opened by D. W. Davis, formerly with the Southern California Edison Company of Los Angeles. In addition to merchandising appliances and radio, Mr. Davis will contract for wiring.

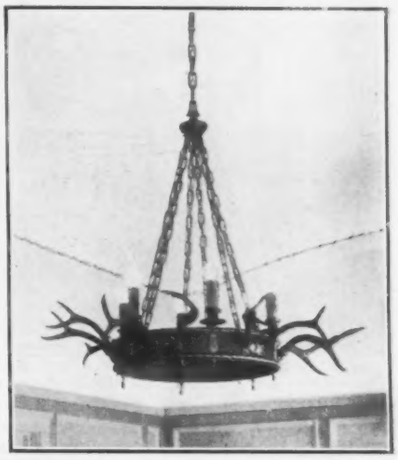
Electric Yacht Overhauled Using Unique Methods

When the auxiliary schooner yacht Guinevere, belonging to Edgar Palmer and carrying the pennant of the New York Yacht Club, tied up at the pier in San Diego, Calif., for overhauling of her diesel engines and electric motors and generators, several unique problems had to be solved by those cooperating in this work.

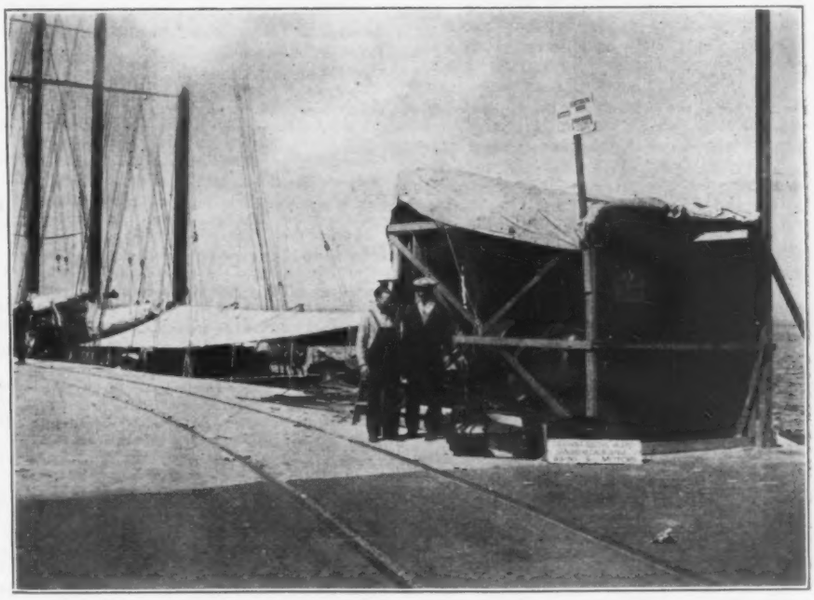
This boat is one of the first electrically equipped yachts and is the result of the engineering efforts of the Westinghouse Electric & Manufacturing Company, all engines, generators and motors having been especially designed. The yacht has 65 Westinghouse motors and generators on board. Everything is done by electricity from the cooking to the hoisting of the sails. The motor driving the propeller shaft is 550 hp. This motor is fed by two 350-hp. generators. Among its other equipment is a refrigeration system which was used for refrigerating over $5,000 worth of meat and had to be kept in constant operation during the yacht's stay of eight days in port.

The overhauling was made possible by Joseph Brennan, San Diego harbor master, the San Diego Consolidated Gas & Electric Company and the California Electric Works. As direct current was necessary, a large motor-generator set was installed on the pier adjoining the boat, which supplied current not only to the refrigeration system but also for the charging of the boat's batteries, and for the complete lighting of the boat. This motor-generator set was kept in constant operation during the entire stay of the boat in port. All repair work was done under the supervision of the San Diego Marine Construction Company. The motor-generator set was furnished and installed by the California Electric Works, San Diego electragists, who also had charge of the overhauling of generators and motors.

Red Seal Home Started in San Diego County.—San Diego County's first Red Seal electric home will be built for Mrs. W. L. McCormick at La Jolla Hermosa, according to E. W. Meise of the San Diego Consolidated Gas & Electric Company, who was instrumental in selling Mrs. McCormick the Red Seal idea. The home, which will cost in the neighborhood of $40,000, was designed by Edgar V. Ullrich, La Jolla architect, and will be built by Henry Barker, La Jolla building contractor. The Messner Electric Company of La Jolla has been awarded the contract for the electrical work. The Red Seal Plan is applicable to all types of homes whether they are mansions or modest bungalows.



This unusual lighting fixture was installed in the summer home of C. C. Rivers of San Francisco in Manor, Marin County, Calif. The six sets of two-point deer horns were mounted on a solid brass band 21 in. in diameter by means of a running thread and a knob on each end. The fixture was manufactured by G. R. Maclaren, electragist of Fairfax, using deer heads supplied by Mr. Rivers.



Motor-generator set installed on the pier adjacent to the electric yacht Guinevere to supply it with direct current for its refrigeration system, charging the batteries and lighting while the motors and generators were being overhauled.

Electric Cooking by New Cafe Builds Business

Restaurants and cafes are recognizing the advantages of electric cooking, and many of them have adopted this method exclusively. The greatly improved quality is perhaps the strongest appeal made by electric cooking. Cleanliness, convenience and simplicity of operation are important factors appreciated by the restauranteur.

An unusual installation has been made in the Sip-and-Bite lunch room in Fresno, Calif. This place has done

Convenience and simplicity are the dominating features of the electrically equipped Sip-and-Bite lunch room in Fresno.

an exceptionally good business since its opening, and the electric cooking has been the subject of considerable comment.

The electrical equipment includes: 3-kw. N-18 Hotpoint oven, 6-kw. 436-G3 Hotpoint griddle with a cooking surface 18 x 36 in., 2-kw. Westinghouse 2-unit full-automatic heavy-duty waffle iron, 2½-kw. L & H hotplate, 2½-kw. Strite toaster, 3 ten-cup Universal percolators, and 2 Everhot Junior 8 cookers. The steam table is heated electrically also with two 1,000-watt General Electric immersion units. A ceiling and desk fan also have been installed for the comfort of patrons. An electric water heater and air heaters are to be installed at a later date.

Chester Stewart is the owner and operator of the place. The electrical installation was made by the Valley Electrical Supply Company, which also sold the equipment.

Electragists Elected Officers of Newly Organized Santa Barbara Electrical Club.—H. L. Miller, electragist, has been elected president of the electrical club which has been organized in Santa Barbara, Calif. Perry Mortinsen of the California Electric Company, also an electragist, is secretary-treasurer of the club. The club meets in the Rockwood Inn on alternate Tuesday nights. The meetings have been well attended and a great deal of interest has been manifested in the organization; there are forty members.

Parsons & Parsons, electrical dealers, Seattle, recently moved to a new location at 438 East 72d Street.

Cross Index for the Electrical Safety Orders—I

Cross-Reference Tables for Use with the Orders Issued by the Industrial Accident Commission of California

A cross-index for the Electrical Safety Orders of the Industrial Accident Commission of California has been prepared by E. Earl Browne, manager of the San Francisco Association of Electrical Contractors and Dealers. This will be an aid to contractors, inspectors and others in the industry, for under any heading all of the references to that particular subject may be found. The first installment is presented herewith.

Subject	Order	Parts of other orders dealing with the same subject
CONDUCTORS—702		
Protecting Conductors from Excessive Current	702- 1(a)	714-1(c); 711-5(d); 711-6(a); 711-9(a)1; 707-4(i).
	702- 1(a)2	704-2(e); 704-7(b).
Voltage Limitations on Circuits for Lighting and Heating	702- 1(g)	707-7(a); 717-4(a).
Special 2-Wire 125-volt Circuits for Appliances and Devices	702- 1(h)	714-1(b).
Special 2-Wire 250-volt Circuits for Appliances and Devices	702- 1(j)	714-1(e).
Paralleling of Conductors	702- 1(p)	703-2(c); 710-4(b); 707-1(h); 711-5(g).
Carrying Capacity of Conductors	702- 1(q)	711-15(e); 713-8(b).
Demand Factor	702- 1(r)	707-5(b)4; 711-5(c).
Supporting Uninsulated Conductors and Copper Bus Bars	702- 1(s)	703-7(c).
Flexible Cords and Cables	702- 1(x)	713-4(b); 703-11(h); 717-4(f); 711-8(a)4; 704-4(a).
Identification of Grounded Conductors	702- 1(y)	702-1(a)3; 707-4(e)5.
WIRING METHODS—703		
Conduit in Wet Places	703- 1(f)	707-1(c)2.
Size of Junction Boxes	703- 1(j)	703-7(c).
Effective Grounding Required	703- 1(m)	704-4(c).
Paralleling Conduuctors in Conduit	703- 2(c)	702-1(p).
Lead Sheathed Cables	703- 3(e)	707-2(b).
General Requirements	703- 7(c)	702-1(s); 703-1(j).
General Requirements	703- 8(a)	716-3(a).
General Requirements	703- 9(a)	711-4(a)1.
Separation from Pipes and Other Objects	703- 9(e)	707-1(d)5.
Restrictions	703-10(a)	703-12(b); 711-4(a)4.
Switch Control	703-11(c)	710-5(b).
Connecting Sockets to Identified Conductors	703-11(d)	702-1(y); 716-1(a).
Receptacles for Attachment Plugs	703-11(e)	702-1(h); 702-1(j)2.
Fixtures Within Reach from Grounded Surfaces	703-11(f)	708-1(d); 708-1(l); 711-8(a)3; 704-4(a).
Temporary Wiring	703-12(b)	703-10.
Temporary Motor Installations	703-12(c)	707-7(b); 711-14(g); 709-2(f).
GROUNDING—704		
Grounding 3-Wire Direct Current Systems	704- 2(b)	704-7(b).
Point of Grounding	704- 2(e)	704-7(b).
The Grounding Conductor for Alternating Current Systems	704- 2(f)	704-7(f).
Grounding Noncurrent-carrying Metal Parts	704- 4(a)	711-8; 705-1(l); 717-4(k); 703-11(f); 702-1(x); 714-1(f).
Grounding or Guarding	704- 4(c)	703-1(m).
General Requirements	704- 5(b)	704-7(d).
Carrying Capacity of Grounding Conductor for Conduit, Cable Armor and Metal Raceways	704- 5(c)	704-2(f).
Grounding Instruments and Certain Coil Circuits	704- 5(e)	705-1(k); 709-5(e).
Conductors Used for Grounding Both Circuits and Equipment	704- 5(f)	704-7(e).
Grounding Service Conduit	704- 7(a)	707-1(g); 704-5(f).
Service Conductors to be Grounded	704- 7(b)	702-1(a)2; 704-2(b); 704-2(e).
Installation of Service Circuit Grounding Conductor	704- 7(d)	704-5(b).
Use of Service Circuit Grounding Conductor as Common Grounding Conductor	704- 7(e)	704-5(f).
Size of Service Circuit Grounding Conductor	704- 7(f)	704-2(f).
SUBSTATION AND TRANSFORMER INSTALLATIONS—705		
Switches and Cutouts for the Protection of Transformer Circuits	705- 1(g)	707-9(d).
Protection of Outgoing Feeders	705- 1(h)	707-9(d).
Types of Switches	705- 1(j)	710-1(b).
Grounding Secondaries of Instrument Transformers	705- 1(k)	704-5(e).
Transformers in Buildings or Enclosures	705- 2(b)	714-2(d).

Subject	Order	Parts of other orders dealing with the same subject
YARD WIRING—706		
Wires on Buildings	706- 1(a)	707-1(a).
Wires Above 5,000 Volts to Enter Substations Only	706- 1(e)	707-8(d).
Underground Splicing Chambers	706- 2	707-2(a).
LOW-POTENTIAL SERVICES, HIGH-POTENTIAL SERVICES, AND METERING EQUIPMENT—707		
Service Conductors Within Buildings	707- 1(b)	707-1(d).
Service and Bus Service Conduit On and Within Buildings	707- 1(c)	707-5(b); 707-4(b); 707-2(b).
Concealed Knob ad Tube Services	707- 1(d)	707-1(b); 707-3(a).
Number of Buildings Supplied by One Service Limited	707- 1(e)	707-4(a)1.
Grounding Service Conduit, Conductors and Equipment	707- 1(g)	704-7.
Connecting Service Conductors in Multiple	707- 1(h)	702-1(p).
Auto-Transformers Prohibited	707- 1(i)	707-7(a).
Conductors to be Lead Sheathed	707- 2(a)	706-2.
Conduit Sizes	707- 2(b)	707-1(c)4.
Underground Services from Underground Sources	707- 2(d)	707-9(c).
Service Switch and Cutout Required	707- 4(a)	707-1(e).
Location of Service Switch and Cutout	707- 4(b)	707-1(c).
All Service Switches to Be at Same Location	707- 4(c)	707-5(b); (Note).
Service Switch-Type and Installation	707- 4(d)	710-1(b); 709-2(f); 709-2(g).
Service Switch to Open All Conductors	707- 4(e)	707-10(f)1; 707-6(a).
Circuit Breaker Used as Service Switch or Cutout	707- 4(i)	710-1(a); 709-3(b); 709-1(a); 710-1(b).
Disconnecting Means for Oil Circuit Breakers	707- 4(k)	709-3(e); 707-9(g); 707-9(d).
Requirements for Other Services Apply	707- 5(a)	707-1(e)3; 707-1(c).
Additional Provisions and Requirements Applying to Bus Services	707- 5(b)	707-4(c); 702-1(r).
General Requirements	707- 6(a)	715-1(a); 707-4(e)3.
Methods of Installation	707- 7(a)	702-1(g); 703-12; 711-14(g); 717-4(a); 707-1(i); 703-12(c).
Methods of Installation	707- 8(a)	705-1(e).
High-Potential Services in Buildings Other Than Substations	707- 8(d)	706-1(e).
Fused Disconnecting Switch	707- 9(d)	707-4(k); (Note); 705-1(g); 707-4(a); Excep. (2)(c); 705-1(h).
Disconnecting Means for Oil Circuit Breakers	707- 9(g)	707-4(k).
Meter Cabinets	707-10(b)	707-10(h).
Meter Switches	707-10(f)	707-4(e); 710-1(b).
WORKING SPACE AND GUARDING—708		
Working and Operating Space	708- 1(a)	713-2(b).
Minimum Working Space	708- 1(b)	703-11(f); 708-1(i).
Insulating Mats	708- 1(i)	710-2(c); 711-11(c); 711-12(c); 713-1(e); 708-1(b).
Isolating Live Parts by Elevation	708- 1(m)	710-2(b).
SWITCHES, CUTOUTS, CIRCUIT BREAKERS AND DISCONNECTORS—709		
Location and Identification	709- 1(a)	707-4(i); (Note); 710-1(b); 710-4(c); 711-9(a)5.
Safety Type Required	709- 2(f)	711-9(a)3; 709-5(c); 714-2(h); 707-4(d).
Circuit Breaker Used as Switch	709- 3(b)	707-4(i).
Disconnecting Oil Circuit Breakers	709- 3(e)	711-9(a)5; 711-9(d); 707-4(k).
Disconnectors	709- 4	705-1(f); 711-9(a)3.
Operating Means	709- 4(a)	707-4(k); 707-9(g).
Fuses	709- 5(a)	710-5(a); 710-5(c).
Switches Required to Disconnect Cutouts	709- 5(b)	710-5(b); 703-11(c).
Switches Not Required to Disconnect Certain Cutouts	709- 5(c)	709-2(f); 709-5(c); 710-4(c).
SWITCHBOARDS AND PANEL BOARDS—710		
Switchboards Operating at More than 300 Volts	710- 1(a)	707-4(i); 709-1(a).
Switchboards Operating at 300 Volts or Less	710- 1(b)	707-10(f)3; 705-1(j); 707-4(d); 715-2(a).
General Requirements	710- 2(a)	711-1(a).
Head Room	710- 2(b)	708-1(m).
Working Space Back of Switchboards and Control Panels	710- 2(c)	715-2(b).
Working Space in Front of Switchboards and Motor Control Panels	710- 2(d)	711-10(a).
Spacing of Switches and Cutouts	710- 4(b)	702-1(p).
Location of Switches and Fuses on Switchboards	710- 4(c)	709-5(c).
Protection of Live Parts	710- 5(a)	715-2(e); 709-5(a).
Switch Required to Disconnect Cutouts	710- 5(b)	709-5(b); 703-11(c); 709-5(a).

Questions and Answers on the Code and Safety Orders

Arrangements have been made with Claude W. Mitchell, electrical engineer of the Board of Fire Underwriters of the Pacific, to answer through the columns of the Journal of Electricity such questions on the National Electrical Code as are of general interest.

Similar arrangements have been made with George E. Kimball, electrical engineer of the Industrial Accident Commission of the State of California, to answer questions on the Electrical Safety Orders issued by the Commission.

While it is the object of this department to assist in a better understanding of the Code and the Safety Orders, replies given are not to be considered as official interpretations applying in all instances, as some of the rules permit of varying interpretations under different conditions. The questioner should be guided by the inspection department having jurisdiction.

All who are interested are invited to send in their inquiries regarding the National Electrical Code to Claude W. Mitchell, Board of Fire Underwriters of the Pacific, Merchants Exchange Building, San Francisco, Calif., or to the Editor, Journal of Electricity, 883 Mission Street, San Francisco. Questions on the Safety Orders should be sent to George E. Kimball, Industrial Accident Commission, State Building, Civic Center, San Francisco, or to the Editor.

Q. 8. Sign Cabinets. Does Order 716-3 (b) restricting the elevation of sign cabinets to 6 ft. above the roof on a working platform apply to hanging signs not more than 12 ft. above sidewalks?

A. Cabinets containing switches, clocks, flashers and similar equipment must be located where they will be safely accessible for repair and adjustment without the aid of a ladder. Where plug type cutouts for the branch circuits of the sign are placed within the sign, it is reasonably safe to permit them at an elevaton of 12 ft. above the sidewalk. It would be no more hazardous under ordinary circumstances to renew plug fuses in the sign while standing on a ladder than it would be to renew lamps.

Q. 9. Is a switch required ahead of an ordinary type of push-button control small motor starting device using thermal relays or thermal cutouts?

A. Switches are required in most cases. These devices commonly use overload protective devices which are not approved for use without a fuse in series with them and switches are required directly ahead of such fuses. There are few switches which meet the requirement of Electrical Safety Order 711-9 (a) (2) by having "no parts alive when in the open position except the fixed incoming line studs or jaws." Several motor starting devices for small motors of 2 hp. and under which are not required to provide running overload protection or low-voltage release protection meet the requirement of the above order and a disconnecting switch for the motor-starting device is not required. The above answer is on the assumption that the branch circuit between the supply feeds and the motor-starting device requires no branch circuit fuse protection. See Electrical Safety Orders 711-5 (i) and 702-1 (l).

BETTER MERCHANDISING

If Summer Comes—Then Refrigerators

Most Advantageous Time for Electric Refrigeration Sales Begins with Advent of Warmer Weather

Neither the equinoxes nor "The flowers that bloom in the spring" have anything to do with the case, as far as the electric refrigerator is concerned. Once a unit is installed in a home seasons may come and seasons may go, but the electric refrigerator stays on forever. This has been the experience of localities where electrical refrigeration has been in domestic use for two or three years now. Therefore it is not alone a seasonal load, by any means. The ice sign may be put away in the bookcase until next year when the first leaves begin to turn pink in autumn, and the old ice box be put in the garret or garage, but this never will happen to the electric refrigerator, once it gets in its effect on the habits of a family accustomed to its convenience.

Nevertheless, there is a logical time to push the sale of electric refrigeration above all other times, and that time is spring. For in spring the housewife's fancy lightly turns to thoughts of refrigeration, as warmer days come to affect foodstuffs in even the most perfect cooler which realtor can extol to the aspiring homeowner.

It is in spring that the last season's ice box is brought out of storage along with "hubbie's" last summer straw hat. both given the benefit of a renovation, and then foisted upon an innocent world as something brand new. And if there is no family heirloom in the shape of a refrigerator to trot out, it is then that the furniture stores are visited furtively to procure a refrigerator for the summer months ahead.

This is the logical or, as the salesmen have it, the psychological moment for the sale of electric refrigeration. Moreover, if an electric refrigerator is sold in these spring months, it may be counted upon that by the time the usual autumn hibernation of ice boxes begins the family which has an electric refrigerator will not retire that efficient and handy servant for the winter on any pretext.

Why Electric Refrigeration?

These are the reasons why you would want electric refrigeration in your own home. Base your selling upon these facts:

Electric refrigerators:

1. Eliminate all the fuss, mess, inconvenience, and dependence upon ice deliveries which housewives have had to contend with in greater or less degree.

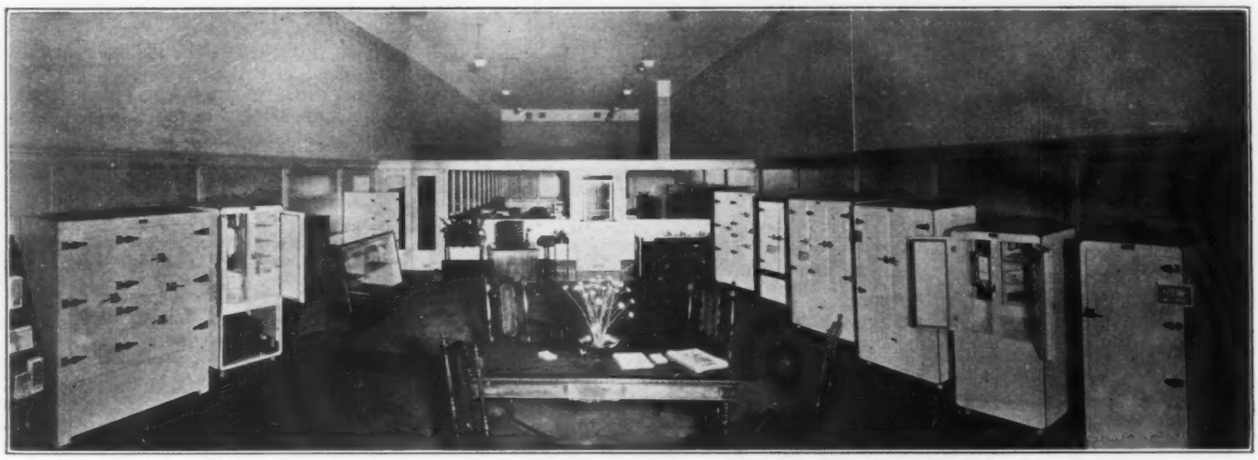
2. Give the home the most modern of appliances for convenient and painless housekeeping. The electric refrigerator is something of which any home may be reasonably proud.

3. Keep foods always in their best condition, fresh, clean, cool, and appetizing, as well as healthful. Besides this they provide a means of making easily many tasteful frozen desserts which were impractical to consider making before.

4. Can be operated at a cost that at least compares favorably with the cost of ice and in most cases provide a real economy not only in operation and upkeep but in preservation of foods.

If This Be the Moment, Then—

Admitting spring as the logical season for refrigerator sales, it is well to admit also that spring alone will not sell refrigerators. There must be sales effort. And because electric refrigeration represents a new departure in many respects, there must be intelligent sales effort, intelligently applied. In this connection it is a commendable sign that the leading electric refrigerator manufacturers have felt that a co-operative effort to sell electric refrigeration is the only sensible plan, and are working together to these ends. They have established certain codes of sales ethics, the most noteworthy feature of which is to be found in the universal determination to sell collectively the idea of electric refrigeration, and not any particular refrigerant or in any way to engage in practices which will reflect discreditably



An attractive new sales and display room is that of Frigidaire in San Francisco

upon any make of refrigerator. No knocking of ice or ice men will be tolerated, either.

These be the things known as "what not to do." Added to them might be any of those other "not to do" things which good salesmanship has eliminated from modern practice.

Articles dealing with particular phases of selling electric refrigerators from the merchandising establishment standpoint appear in other columns of this issue. Each one points to some tangible treatment of the general sales problem. But it is of importance that the individual salesman's problems in selling electric refrigerators should be considered in the light of experience, too.

The broadside to the prospect prepares the way. Advertising in the newspapers lays the foundation for individual effort. Attractive display rooms and well planned demonstrations crystallize some of this preliminary sales effort. Yet, when all is said, these are the barrage which break down the resistance of the prospect. And it is important that those who go over the top and take the order home must be prepared to sweep aside the remaining obstacles by individual salesmanship.

What of the Salesman?

For the individual salesman selling refrigerators there are three major lines of action. They are:

1. Sell the machine on what it will do, and not on its mechanism.
2. Sell the convenience and cleanliness of electric refrigeration without knocking ice or ice men.
3. Sell the attractiveness and pride of ownership in an electric refrigerator.

One of the easiest things to do in selling electric apparatus to the average person interested at all in mechanics, is to talk too much machinery and not enough "what it will do" and "how well it will do it." The man who tinkers with the valve adjustment on his own car may want to hear all about the brine tank, and the refrigerant, and condensing coils. But the housewife is rare who cares a hoot about anything except what it will save her in food, trouble, dirt around the kitchen, and peace of mind.

If the refrigerator will make the home a better home, preserve foods and so safeguard her children's health, save her work and bother, and besides provide her with a facile means of preparing tempting frozen desserts, then she is interested in it. And the wise salesman dramatizes all these features in such a way as to make her feel herself actually cast in the role of owning one. When she gets a taste of the pleasure of that ownership in the way the refrigerator is presented to her, she never will be satisfied until she actually has one so that she can live the experience every day in her own home.

When the desire to own an electric refrigerator has been thoroughly aroused, then the prospect may demand to know how it all works. When that period is reached, a simple, nontechnical explanation of the mechanical features of the plant will be in order. And even then, the stress should be laid upon those features of the mechanism which will make for a long and useful life without bothersome servicing.

The convenience of electric refrigeration is a strong selling argument, but it is here that the nearest approach is made to dangerous ground. Convenience is largely a matter of superiority over ice, and each advantage of electric refrigeration over previous methods should be stated tactfully.

For instance, the housewife having an electric refrigerator may be shown that it will make her independent of ice deliveries; that it will not be necessary to bring ice into the kitchen; that the refrigerator may be placed to suit her own convenience without reference to its accessibility to icing; that it makes its own ice cubes in convenient size for every domestic use; and that she may buy foods with respect to market without fear of spoilage, for they may be kept indefinitely in an electric refrigerator which maintains a constant low temperature.

Beware of the Wily Germ

Food preservation by means of refrigeration isn't anything particularly new, and the public is acquainted pretty generally with the necessity from a sanitation standpoint for keeping foods at a low temperature. And yet one of the most effective arguments for electric refrigeration is in the fact that it not only provides low-temperature food preservation, but can maintain it better.

Beware that the prospect is not scared to death by a lot of terrifying facts about disease germs breeding within the food in warm-room temperatures. Some life insurance may be sold by half scaring the prospect to death, whereupon he sees already a family in want and all that sort of thing. But fear-salesmanship more often than not reacts unfavorably and the victim of it resents the fact that he has submitted to panic. So while germs are germs, and electric refrigeration keeps them in their place, it is well in talking electric refrigerators to use more healthful means of bringing these conditions forth.

That may be accomplished best by tactfully giving the prospect credit for a full appreciation of the value of keeping foods clean and pure and free from contamination by correct refrigeration, and then showing how much better a job of temperature regulation is accomplished by the electric machine.

How Much Does it Cost to Run One?

The idea that electric refrigeration may cost more than other methods still holds, and yet investigations and tests have proved this to be untrue. But even supposing an electric refrigerator is placed where it must go on the lines at a high rate, the economies it will make in food preservation will make up for differences between the cost of ice and electricity.

100,000 Broadsides to Sell 2,200 Refrigerators

Edison Company Handling Four Makes Plans to Sell to its Range Customers Throughout Territory

With its list of electric-range customers as a preferred list of prospects the Southern California Edison Company has set itself the goal of 2,200 electric refrigerators for 1926. This quota, in the face of the fact that this company heretofore has sold no refrigerators, shows a faith in the future of electric refrigeration which is to be justified in the indications already evidenced by popular demand. With a program of this magnitude in view it will be of interest to others contemplating electric refrigeration sales to examine into the sales plan proposed by the Edison company.

Feeling that its territory presents a market of rich potentiality for refrigeration sales, the Southern California Edison Company, in its new merchandising program, determined first the extent of this market and also its likelihood as to salability for this particular appliance. With these factors in mind, a quota of 2,200 units was proposed, and sales plans designed to dispose of this large number of refrigerators were prepared.

It was decided by the Edison company that it would divide this quota among four makes of electric refrigerator, namely, the Kelvinator, Servel, Frigidaire and Electro-Kold. Only completely equipped cabinets are to be handled by the Edison company itself, provision being made whereby prospects desiring a refrigerator unit for an old ice box may be turned over to a dealer.

All refrigerators are to be sold at the manufacturer's list price. Time payments are being arranged through an acceptance corporation whereby the purchaser may have six, twelve or eighteen months on varying types or grades of refrigerators.

An attractive plan also has been devised to induce contractor-builders who are building groups of homes or apartment houses to purchase the refrigerators on a discount basis, the same discount being allowed as that given to other refrigerator distributors in the territory. These discounts are to be based on the last refrigerator purchased, just as lamp and other quantity merchandise is discounted to dealers. That this plan is successful is to be seen in the fact that several blocks of machines already have been sold to contractors and builders for installation in new homes.

Using the electric-range customers as a preferred list of prospects, with the special advantage of being able to use electric refrigeration with an already lowered rate, a series of 50 broadsides is to be sent to each of these customers, as well as to other prospects considered likely purchasers. This will require 100,000 broadsides. Each of these broadsides is being prepared carefully as to advertising-copy appeal and attractiveness, the little trade character, "Busy Buttons," being used effectively to introduce the refrigerator's good points to the reader.

This campaign is directed not alone

to the housewives. Letters are being sent to the husbands as well, inviting them to see the displayed refrigerators at the nearest district office. It is hoped that in this way some of the sales resistance which usually accompanies selling only to one member of the household may be broken down. Following are texts of the two letters sent, one to husband, the other to wife:

Letter to Men

Mr. George Sheridan,
715 Orange Street,
Alhambra, California.
Dear Mr. Sheridan:

There is an electrical refrigerator in our office that we want you to see. Its beauty of design and simplicity of construction will appeal to you.

It is an appliance that sooner or later you will want in your home. That it may be sooner rather than later, a simple sales plan has been devised so that any Edison consumer can begin enjoying electrical refrigeration at once.

Drop in and ask questions. Look at the models on display. The women of the community already know about the many features of electrical refrigeration that no icebox can supply, but we want the men to know them too. Hence this letter.

Will you come?

Cordially yours,

District Manager.

Letter Sent to Housewives

Mrs. Howard Little,
2142 Sunset Road,
Pasadena, California.
Dear Mrs. Little:

Electrical refrigeration—clean, cold and dry—is now within reach of all Edison consumers.

Standard makes of electrical refrigerators have been carefully studied and from them several types have been selected which we recommend and guarantee. You may see them at any of our offices.

The prices are reasonable. If desired, deferred payments may be arranged.

We have done all that we can to give you the kind of refrigerator you have wanted. Our representative will call in a few days and we are sure you will be interested in what he has to say.

Very truly yours,

District Manager.

To tie in with this publicity effort, extensive displays will be used in each of the district offices. Demonstrations will be staged, and newspaper advertising will be used freely. House-to-house canvassing is also in contemplation in certain instances.

To Co-operate With and Protect Dealers

Believing that there is a fundamental principle involved in the plan, the Edison company intends to further the efforts of the dealers in its territory to the fullest extent. It believes that it should not engage in unprofitable undertakings and to this end will protect the selling price of the machines so that the margin of profit shall be sufficient for dealer and company to cover all selling costs. This is based also on the idea that if the company does not make the sales pay their own way, certain of its customers will be bearing part of the selling cost for which they derive no direct benefit.

Denver Quota Set at 1,000 by Public Service Company

What is believed to be the most ambitious Western central-station refrigerator sales program, considering the size of the city served, is being launched in April by the Public Service Company of Colorado, according to late word received from G. B. Buck, manager of the commercial electric department. Although delayed a bit in starting the campaign, the magnitude of the program was such that careful preparation had to be made for its auspicious launching.

The campaign started April 5 and is to continue during April and May, with a quota of 1,000 machines set for Denver alone. The bogey for the year is 3,000 machines. Although the present campaign is limited to the Servel machine, the company also merchandises the Frigidaire and General Electric machines, for which a later summer campaign is planned.

Extensive newspaper advertising announced the campaign in the last few days of March and the first days of April. Full page advertisements advised the public that the company was willing to place the machines on two weeks free trial. As a result 27 machines were placed the first day.

A sales organization for this campaign has been made up from the refrigeration, domestic electric, and radio sales staffs with the help of three factory men, making a total of 40 men to work the city, with teams of ten men in each of three districts of Denver. Special prizes have been offered for leading teams and captains.

An elaborate campaign manual also is being prepared for use throughout the company system. The campaign is in charge of G. B. Buck, who was also responsible for working out the details of the program.

Refrigerator Sales Plans Told by Western Agents

In response to an inquiry as to the sales plans contemplated by Western distributors of electric refrigerators, the following statements were received detailing the policies of several well known makes:

Frigidaire

A complete program, taking into account all outlets for their product, is contemplated by the Delco-Light Company, manufacturers of Frigidaire, according to W. L. Cochran in charge of the San Francisco sales branch. He says:

"In all of the cities as well as in provincial territories we have salesmen who devote all of their time and attention to selling of Frigidaire. They secure their prospects by a house-to-house canvass. Each salesman has his own particular territory to take care of.

"The Delco-Light Company will spend $1,800,000 in 1926 for national and newspaper advertising. In addition to that we will use billboards and road signs, and, of course, exhibit our product at all state and county fairs, as well as industrial exhibits and food shows.

"In the smaller towns we tie up with some good electrical dealer, placing a Frigidaire in operation on his floor, and pay him a commission on all sales he makes and on leads he furnishes us which are closed by our salesmen.

"To the power companies who merchandise we sell direct, they furnishing their own sales crew. To those who do not merchandise we supply Frigidaire for installation in their various offices.

"Owing to the fact that the mechanical, or rather electrical, refrigerator load is constant, has no peak and is heaviest in summer time, it is a very desirable one for the power companies. They are giving us wonderful co-operation."

Copeland

Of the Copeland refrigerator system, Listenwalter & Gough, Pacific Coast distributors, have made the following brief statement:

"No effort will be made to sell Copeland systems direct to the public inasmuch as we have a dealer policy. A complete dealer co-operative plan has been developed embodying sales and service assistance of such character that it makes it a comparatively easy thing for a dealer to get into the business.

"For the present we are not presenting our system to the power companies but have an exclusive dealer set-up."

Zerozone

The Zerozone machine, manufactured by the Iron Mountain Company of Chicago, for which Ernest Ingold, Inc., is distributor in northern California, and Gilbert E. Foy in southern California, will be sold only to established dealers, according to the preliminary plans of the company. The distributors will handle the machine on a wholesale basis only. At the present 90 dealers have been lined up, each with an average of two machines, and more aggressive sales plans are to follow.

Servel

No direct selling of refrigerators to the public is to be done by the representatives of the Servel, according to a Coast distributor of this machine. Instead, a complete co-operative plan has been worked out whereby all outlets for the machine are to be given the benefit of manufacturers' advertising and sales force effort.

Demonstration units are to be placed with all dealers handling the machine; besides this many displays will be placed at fairs, in power company offices and wherever necessary to show the machine to advantage. An advertising program of great magnitude is being undertaken by The Servel Corporation in all leading national magazines and in newspapers. Extensive dealer helps, such as brochures and pamphlets in color, cards, and similar material, have been prepared.

Power companies which merchandise are sold the machines on the same plan as other dealers. This consists of a franchise arrangement similar to automobile selling by territories. Each dealer, whether power company or otherwise, makes all sales in his territory, the sales efforts of the Servel staff being given co-operatively to its dealers, they making no sales for Servel itself. House-to-house canvass for prospects or other legitimate means of getting prospects are to be employed in this dealer co-operation plan.

You Can Have SERVEL Refrigeration To-day

SERVEL is ready for your home to-day after many years of development by one of the country's largest manufacturers of domestic refrigerating apparatus. Backed by five years actual use in American homes, Servel now offers you immunity from refrigeration worries. No more waiting at home for the ice man. No more running out of ice over the week-end. No more spoiled food because the ice box would not maintain a low enough temperature. No more worrying for fear the ice will run out while you spend a day or so away from home.

SERVEL DOES ITS WORK SIMPLY

For Servel is ever at work. When the temperature rises above a certain point—which is much lower than the ice box ever attains—a simple automatic control starts the motor. Servel goes quietly to work. The temperature falls. The motor is automatically cut off. Servel uses electricity thriftily. It wastes none. And you will find that Servel works unobtrusively day after day, month in and month out. What a welcome relief from the old ice box.

SERVEL ELECTRIC REFRIGERATOR

THE SERVEL UNIT

SERVEL is ever at work. When the temperature rises above a certain point—which is much lower than the ice box ever attains—a simple automatic control starts the motor. Servel goes quietly to work. The temperature falls. The motor is automatically cut off. Servel uses electricity thriftily. It wastes none. And you will find that Servel works unobtrusively day after day, month in and month out. What a welcome relief from the old ice box.

DISTRIBUTORS

HEESEMAN-POLLARD COMPANY

SERVEL refrigerators are self-contained. The base houses the motor and compressor, the actual refrigerating unit is contained in one of the upper sections. If you have a good ice box and wish to keep it, you can still have Servel refrigeration. For Servel refrigerating units are made that fit right into the ice compartment of the old-fashioned ice box. In such cases the motor and compressor are installed in the basement, or near the refrigerator. But no matter what style you choose you are assured of modern refrigeration.

FREE TRIAL IN YOUR OWN

Just as candles gave way to electric sad-irons to electric irons, clothes boilers to electric washing machines, and broom to vacuum cleaners, the old ice box is giving to bow to electric refrigeration —Servel refrigeration. And you can have Servel refrigeration right away. Servel is offered to you on a free trial, in your own home. If you like it, and you will, convenient terms may be arranged for payment. Have the postman pick up the card today.

SERVEL ALSO SOLD AND INDORSED BY

FARMELEE OSBORNSEN — H. L. MILLER

CITRIC CO. Ghostly

At The

Modern (Electric) Kitchen

New Open from 9 a. m. to 5:30 p. m. Daily

The KELVIN-ET

Kelvinator, with Refrigerator, Complete

Here, at last, is Kelvinator Electric Refrigeration for the person living in a small house or apartment. It is the new Kelvin-et.

The low price, $280.00, includes both Kelvinator and refrigerator. Every part is enclosed in the refrigerator. It can be set in place like any article of furniture and the only connection required is "plugging in" as you would an electric iron.

The interior of the Kelvin-et stays many degrees colder than that of the best ice-cooled refrigerator. It operates automatically, requires no attention and relieves you of the worry and trouble of ice delivery. You will find it not only a time saver but an economy as well, for its costs less to operate it than to buy ice.

You can have a Kelvin-et installed in your home and pay for it on your own terms.

The first time you are downtown make it a point to drop in at our store and see the Kelvin-et in full operation in our Modern Electric Kitchen.

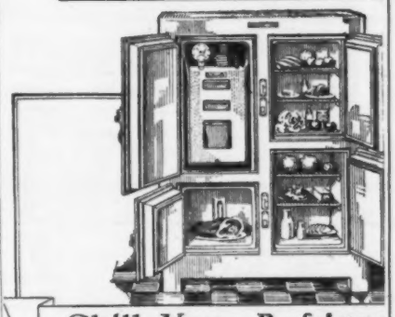
BOISE 824 Main St. 2—Stores—2 NAMPA 1306 First St. S.

KELVINATOR

The Oldest Domestic Electric Refrigeration

See the Kelvinator at the

Modern (Electric) Kitch



Chill Your Refriger With Electricity

Put Kelvinator electric refrigeration in your present refrigerator and you can forget refrigeration problems. Kelvinator never melts, requires no attention and never needs renewing.

It will keep your refrigerator many degrees colder than ice does. More than that, it will keep it free from moisture. This dry, intense cold not only keeps foods fresh for days but actually improves them.

With Kelvinator you still table use, as Kelvinator f electric cubes of it in the freezing unit. Ices, sher desserts can be frozen trays.

It costs less to own a K to buy ice. You can ha installed in your home at your own terms.

The first time you are downtown make it a plea to drop in at our store and see the Kelvin-et in full operation in our Modern Electric Kitchen.

BOISE 824 Main St. 2—Stores—2 NAMPA 1306 First St. S.

ADVERTISING may be compared to a barrage, preparing the field of action for the troops that follow under its protection. The advertisements on this page constitute very effective artillery fire for refrigerator campaigns. Broadsides and newspaper advertisements are represented here, the upper left being the broadside prepared by The Servel Corporation in its exploitation plan and used by dealers or central stations. On the left and right of this box are reproduced two advertisements used by the Walker Electric Company of Boise in its recent campaign. At the bottom of the page are two broadsides and a newspaper advertisement used by the Southern California Edison Company in its present campaign. Manufacturers and merchandisers are co-operating in the preparation of this type of publicity matter, interchanging ideas, copy and engravings.

Candles and Ice Belong to Another Age

CANDLE-LIGHT seemed satisfactory when these were the only means of illumination available.

The ice box seemed satisfactory only because nothing else was the only means of refrigeration available!

SerVel may also be installed in your own refrigerator at reasonable cost.

Those attending the Facts Free Electric Cooking School are cordially invited to inspect the

SerVel Electric Refrigerator

which Miss Galvin is using this week. She will be very glad to explain its operation.

FOR SALE BY

rn California Edison Company

For Every Home According to Its

Whatever size home you have, you can enjoy electrical refrigeration. There is a size refrigerator to suit the requirements and the purse of every family.

This Company takes in your old ice box

Come and look them over at any office of the EDISON COMPANY

Small "T Payments

"Of course—the housewife who learns how the **ELECTRIC REFRIGERATOR** works *will want one"*

Your friend Busy Buttons has been looking into the merits of the Electric Refrigerator and he is anxious to share the good news with you.

For Electric Refrigerators work wonders in the kitchen. They bring new dainties and delicacies within your reach; save unbelievable quantities of food; protect your health; and cost little to operate.

Busy Buttons will bring you this wonderful convenience in a surprising manner. He is prepared to place it in your home on such terms that it will begin to pay for itself from the time it starts to serve you.

This may sound too good—but it is true.

[*The plan is very easy*]

ELECTRIC REFRIGERATOR COMPRESSOR DIRECTORY

Published and Copyrighted by Journal of Electricity, October 15, 1925

A list of domestic electric refrigerator compressors giving catalog information on the equipment of each, with complete list of Western Distributing Agencies where repair parts may be secured. The publisher does not guarantee this information, but to the best of our knowledge it is correct at date of publication. When referring to this list in any way, mention the **Journal of Electricity.**

Therm—Thermostat
Merc Therm—Mercury Thermostat
Press Therm—Pressure Thermostat
Recip—Reciprocating
Wx—Westinghouse
GE—General Electric
Cent—Century
Wag—Wagner
Em—Emerson
Delco—Delco Light Co.
No W—North Western
Lld—Leland
DFM—Dayton Fan & Motor Co.
WE—Western Electric

Name of Manufacturer	Trade Name	Model or Catalog No.	Control	Refrigerant	Compressor Cooling	Motor H.P.	Motor Maker	Drive	Dimensions (Inches)	Weight	Maximum Capacities: Food cu. ft.	Maximum Capacities: Melting effect of ice per hour	Maximum Capacities: Table Ice Cubes in lbs.	Reatil Prices Maximum and Minimum West of Rockies*	Western Sales Representative	Western Distributors	Nearest Point at which Repair Parts may be Secured
American Electric Corporation, 46 E. 20th St., N. Y.	Electrice	A B	Therm Therm	Sulphur-Dioxide "	Air	1/4	Em Wag Cent	Direct	.....	36 36	5½	110	5	$260 to $295 plus freight		None	'actory
California Refrigeration Co. 2005 San Fernando Road Los Angeles, Calif.				Sulphur-Dioxide		1/8					50	5		$475		**California Refrigeration Co.** 2005 San Fernando Road Los Angeles, Calif.	Los Angeles
Copeland Products, Inc. Detroit, Mich.	Copeland Refrigerating Systems	E	Therm	Iso-Butane (Freezol)	Air	1/6	DFM	V-belt	14½x25 x23½	110	40	7	2¾ to 8	$250 to $425 plus installation	**E. B. Wilson** 8375 Fountain Ave. Hollywood, Calif.	**Listenwater & Gough** Los Angeles, San Francisco **E. L. Knight & Co.** Portland.	Los Angeles San Francisco and Portland
Delco Light Co. Dayton, Ohio	Frigidaire	1 cyl. A.C. 2 cyl. A.C. 2 cyl. W.C.	Aut. Low Pressure	Sulphur-Dioxide " "	Air " Water	1/4 " 1/3	Cent Wag Em Delco	Belt " Gear	18½x23½x19½ 16½x29 x21 21 x30 x18	191 216 325	10 35 50	3.6 7.1 8.5	7½ 17 20	$190 plus frt. and installation $260 to $320 plus freight and installation $285 to $340 plus freight and installation	**J. A. Harlan,** Sales Mgr. Dayton, Ohio	**Delco Light Co.,** 1525 16th St Denver **Delco Light Co.,** 871 Mission St., San Francisco **Delco Light Co.,** 1518 W. 7th St. Los Angeles **Modern Appliance Co.** 1612 2nd Ave., Seattle **Indep. Lt. & Power Co.,** 134 E. 2nd St., Salt Lake	Distributors or dealers
Electro-Kold Corporation Spokane, Wash.	Electro-Kold	A C F	Merc. Therm " "	Sulphur-Dioxide		1/2 1/4 1/4	Cent GE	Belt " "	42½x20 x28 24 x18 x20 30 x18 x22½	225 142 147	60 10 40	....	18 12 15	$230 to $385 " " " "	Dealers Appointed in West	.....	At all dealers
General Electric Company Schenectady, N.Y.	GE Refrigerator	OC-2 Form 1	Therm	Sulphur-Dioxide	Air	1/6	GE	Direct	35 high 18 dia.	200	9 15	4–1/6	7	$550 to $675	**General Electric** in all large cities.	.....	Any General Electric office.
General Refrigeration Company Beloit, Wis.	Lipman	25 50	Therm	Ammonia "	Water "	1/4 1/2	GE	Belt "	29x16–9/16 x23 34 x17 x27	450 585	.....	10–5/6		$450 average	**C. Sowers**	**Gray, McLean & Percy,** Seattle, Portland **Price, Teltz Co.,** San Francisco **General Ref. Co. of Calif.,** Los Angeles **West Coast Gas Eng. Co.,** San Diego **The Daly Co.,** Denver **Automatic Ref. Co.,** Salt Lake	.....
Iron Mountain Co. Chicago, Ill.	Zerozone	C5 C10 C15 C20	Merc. Sw.	Sulphur-Dioxide	Air	1/4	Cent	Belt	.....	....	5—30	.....	.....	$210 to $275 F.O.B.	**Ernest Ingold, Inc.** 950 Van Ness Ave., San Francisco	**Gilbert E. Foy,** 1027 Loewe State Bldg., Los Angeles	.....
The Isko Company 2525 Clybourn Ave. Chicago, Ill.	Isko	20 200	Therm-Aut "	Sulphur-Dioxide "	Water "	1/4 3	Cent Em GE	Direct "	36 x 9 x16 60 x24 x18	100 120	40 1400	200	120	$300 to $400 $595 to $800 $895 to $1495		**A. C. Beckman,** Missoula, Mont. **R. L. Henderson,** Omaha	
Kelvinator Corporation 2072 W. Fort St., Detroit, Mich.	Kelvinator Electric Refrigeration	Jr—1 cyl Sr—2 cyl	Therm "	Sulphur-Dioxide "	Air	1/4 "	Wag Cent Em Lld	Belt "	30½x17 x26½ 30½x17 x24½	160 140	70 20	225 135	15½ 7½	.....	**L. D. Robertson** 1522 W. 7th St. Los Angeles	**Leo. J. Meyberg Co.** 973 Mission St., San Francisco	
Refrigo Corporation 18th & Forest Aves., Milwaukee, Wis.	Refrigo	.....	Merc Therm	Ammonia		1/4	Cent WE	Belt	18 x24 x22	185				.....	.....	.....	.....
Servel Corporation 510 N. Dearborn St., Chicago	Serv-el	No. 1 2 4 5 8 51	Press Therm " " " " "	Methyl Chloride " " " " "		1/4 " " " " 3/4	Cent & GE " " " " " " " " " "	Belt " " " " Gear		300 " " " " 515	....	....	60 to 80 to 96 to 100	$295 to $700	**Servel Corporation** 809 So. Los Angeles St., Los Angeles.	District Offices at 447 Sutter St., San Francisco; 1933 5th Ave., Seattle; Gas & Elect. Bldg., Denver.	Evansville, Ind., Emergency Stock, Los Angeles.
Superior Refrigeration, Inc. Lima, Ohio	Superior	5 12 32	Merc Therm "	Sulphur-Dioxide	Air " "	1/4 1/4	Cent Lld	Belt "	19 x21 x27 "	180 250 270	7½ 15—30 35—45	5–5/24 10–5/12 14–7/12	36 100 108	.....	.....	.....	Omaha
Universe Corporation 77 W. Washington St., Chicago, Ill.	Polaris	Kitchenette Apt. Spec. Ideal Peerless	Therm	Sulphur-Dioxide		1/4	DFM	Belt	19 x24 x17½	300				$350 F.O.B. factory " $400 F.O.B. factory $475 F.O.B. factory	.....	.....	.....
Valley Elect. Refrig. Works Buffalo, N. Y.	Valley Electric Refrigeration	Compressor "A" "B" "C" "D"	Press Therm	Sulphur-Dioxide		1/6 to 1/3	Cent	Chain	31 x24	260				$295 to $585	**W. S. Ray Mfg. Co.** 118 New Montgomery St., San Francisco, Calif.	**W. S. Ray Mfg. Co.** San Francisco	San Francisco Buffalo, N. Y.

NEWS OF THE INDUSTRY

Oversubscribe First B. C. Electric Railway Customer Stock in Five Days

Phenomenal success in inaugurating a customer-ownership policy was achieved by the British Columbia Electric Railway Company recently when the public of Vancouver and Victoria applied for more than $7,000,000 of 6 per cent cumulative preference shares of the British Columbia Electric Power & Gas Company, a subsidiary, in five and a half days between March 15 and 20. The amount offered for sale was only $2,250,000, of which $1,500,000 was underwritten by a syndicate of local bond dealers and the remaining $750,000 allotted to employees to buy themselves or sell.

The employees of the company brought in no less than 10,851 applications for a total of $5,625,300, although the bond dealers sold their allotment at the same time. The employees' portion therefore was oversubscribed more than seven times. As the entire issue authorized was $5,000,000, more than $2,000,000 in applications will be refused.

The population of the territory served being only 350,000, this is believed to be a record, at least for a first customer-ownership campaign. Applications were limited to fifty shares and none were admitted from other than residents of the province of British Columbia.

It is believed that another record was made in the number of employee applications for shares. Out of a total of 2,985 permanent employees, including railway, power and gas departments, 1,410 applied for a total of $602,000. This amount is more than two-thirds of the employees' allotment. More than 47 per cent of all employees are now shareholders. Shares were sold to the public at 99.

As already has been announced (Journal of Electricity, March 15, p. 235), the B.C. Electric Power & Gas Company was incorporated to make customer-ownership possible. The railway company is an English company and its dividends or interest payments are subject to English income tax, which makes the ownership of its shares or stock in Canada not feasible. This, therefore, was the first effort towards customer-ownership by the B.C. Electric Railway Company or any of its subsidiaries.

It originally was planned to open the sale on March 20, although incorporation of the new company was accomplished only on March 4. Knowledge of the incorporation and its purpose having spread, without any direct publicity campaign being started, there arose such a demand for stock that it was impossible to hold back the sale. Employees and brokers therefore were allowed to take applications on March 15, in spite of the fact that the main advertising of the campaign could not be advanced more than two days or to March 17.

The brokers' allotment was sold entirely in two days and the employee allotment practically in twenty-four hours. When the advertising began to be felt on the third day of the sale, applications double, pouring in that day to the extent of no less than $1,200,000.

In the official prospectus March 31 was named as the date for the closing of subscription lists. When oversubscription was seen to be inevitable, this date was advanced to March 20 and employees were requested to solicit no new applications. Advertising was discontinued, a great deal of material, including car cards, posters and newspaper advertisements, being discarded unused. In spite of this, applications continued to pour into the company's offices. Employees were requested by their friends to try to have applications accepted. Begging letters were received even after the close of the campaign asking the company as a favor to sell the customer some shares. It was less a case of selling shares than taking orders.

Some of the figures concerning the campaign are interesting. The city of Victoria with a population of some 50,000 applied through employees for more than $1,000,000, or more than the entire employee allotment. One department of the head office, the accounting department, with 187 employees, sold $700,000 worth of shares or almost the entire original employees' allotment. Three hundred motormen and conductors on Vancouver city lines applied for $132,700 worth of shares themselves. This department also made 959 public sales amounting to $458,800.

Ten-ton draft tube liner built by Baker Iron Works for the Southern California Edison Company.

Local newspaper comment declared that the oversubscription was an indication of the confidence in the integrity of the company. It was pointed out that no such public subscription had been received since the Victory loans of 1917. 1918 and 1919. It is believed that the offering was the largest ever made by a Canadian company through the medium of a customer-ownership campaign, and the oversubscription of this offering therefore creates a double record.

All previous financing by the British Columbia Electric Railway Company and its subsidiaries has been done in England. The president of the company is George Kidd and the head office is in Vancouver. The customer-ownership campaign was in charge of William Saville, general secretary, E. H. Adams, comptroller, and James Lightbody, publicity manager.

Modern Telegraphic Service for Mexico Arranged For

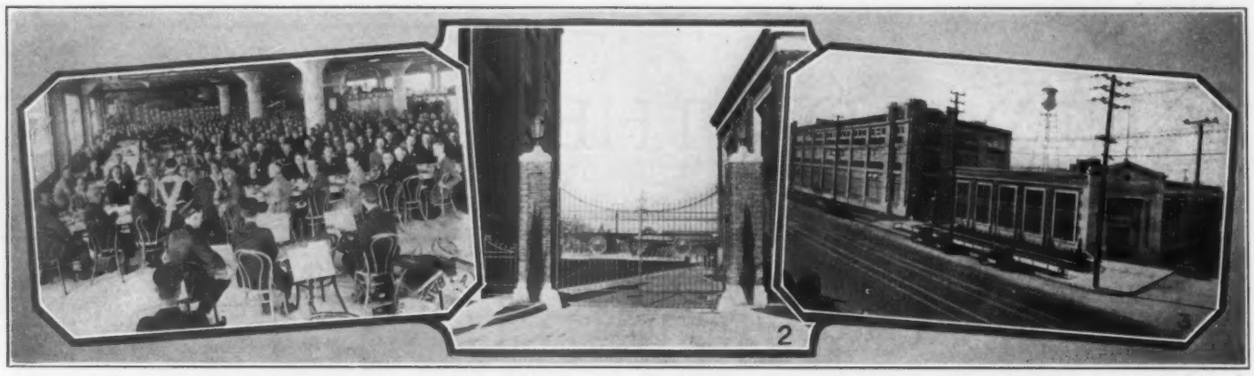
Subject to the approval of President Calles of Mexico a contract has been concluded between the Western Union Telegraph Company, the Mexican Telegraph Company and the Mexican government whereby modern telegraphic service will be introduced into Mexico. The arrangement includes the extension to international traffic of night-letter, day-letter, night-message and money-transfer service.

This direct service to Mexico will be extended to sister republics south through All-America Cables.

Ten-Ton Draft Tube Liner Built for Edison Company

To replace the worn steel liner of a large concrete draft tube in power house No. 8 of the Big Creek-San Joaquin system of the Southern California Edison Company, the Baker Iron Works of Los Angeles shipped a draft tube liner the latter part of January made of cast iron weighing 10 tons and capable of sustaining a pressure of 1,000 lb. to the square inch. In placing the order for this liner with the iron works the engineers of the Southern California Edison Company presented a problem requiring exceptional exactness in casting and machining.

The liner was cast in eight sections for greater convenience in shipping. It was required that these sections be assembled with absolutely close joints and the whole liner inserted in the draft tube opening which exactly fits it.



When is a warehouse not a warehouse? The answer is to be found in the occasion of the Los Angeles Electric Club's visit, en masse, to the new General Electric Company warehouse and offices, when these same buildings became a large banquet hall. Left—the club assembled to partake of the G. E. fare. Center—the ornamental gateway to the new yards. Right—the two buildings as they appear finished.

General Electric Entertains Club in New Quarters

More than 400 members of the Electric Club of Los Angeles were guests of the General Electric Company at a luncheon given in the company's new Los Angeles quarters March 22. The luncheon, arranged by S. E. Gates, president of the club and general manager of the General Electric Company, Los Angeles, was served on the third floor of the new warehouse. One end of this floor was cleared off, and temporary tables set up at which the guests were seated. A temporary kitchen was set up also.

Talks on the tremendous increase in the use of electricity during the past decade featured the program. Henry M. Robinson, president of the First National Bank of Los Angeles, as the principal speaker, gave some interesting statistics portraying this growth. He pointed out that in the field of agriculture alone more than 850,000,000 kw.-hr. of electrical energy are being used annually and that of this vast amount of energy more than 60 per cent is consumed in California. He further stated that estimates now placed the number of people who are connected in some way with the electrical industry in the United States in excess of 6,000,000. Other speakers were M. P. Rice, manager of publications in the General Electric main office at Schenectady, and George Emmons, ex-vice-president of the General Electric Company.

Following the luncheon the entire gathering enjoyed a personally conducted tour of the fine new offices, warehouse and service shop of the host.

Great Western Power Company to Lay Fifth Bay Cable

Increased business has made necessary important additions to the San Francisco system of the Great Western Power Company of California that will involve an expenditure of $1,200,000 during the next few months, according to L. M. Hardie, local division manager. The additions will include the laying of the company's fifth bay cable, construction of a power transmission line from San Francisco to Half Moon Bay (Journal of Electricity, Jan. 1, p. 30), and the building of two new substations on this line.

The submarine cable will bring an additional 15,000 hp. of electric energy into San Francisco at a cost of approximately $332,000. It will be laid between a point near Richmond and Pier 39 on the San Francisco shore, a distance of 40,000 ft., establishing a new record as the longest high-voltage cable of its capacity ever laid. It will exceed by more than 2,000 ft. the length of Bay cable No. 4, installed in January, 1923, between Brooks Island and San Francisco. The new cable will be similar in construction, consisting of three 500,000 circ. mil copper conductors with shore ends of 750,000 circ. mil copper. The diameter of the cable will be 4¼ in., the conductors insulated with rubber and surrounded with an impregnated filling. Heavy armor wires will protect the whole from external injury.

Electron-Physics Discussed for San Francisco Engineers

Proving himself to be a great human as well as one of the foremost scientists of the present generation, Dr. Michael I. Pupin, president of the American Institute of Electrical Engineers, addressed a capacity audience in the auditorium of the Pacific Gas and Electric Building, San Francisco, on the evening of March 26.

Dr. Pupin was able to paint so beautiful a picture of his conception of the electron theory of physics that he carried his audience along with him, almost breathless. Tracing briefly the historical highlights of experiments, developments and discoveries that have led up to the present firm establishment of the modern conception of electron-physics, the speaker digressed interestingly to discuss the personal characteristics of the scientists and inventors whose life works have been valuable contributions toward a modern and a correct understanding of the subject.

Chief among the many statements of Dr. Pupin were those to the effect that all energy is due to electrons in motion and that the mass of all bodies is dependent upon their electronic content. Thus the popular conception of electricity seems due to be changed from that of a force with which street cars and factories are run to that of a force that is the vital, controlling factor of the universe.

New Colorado Corporation Takes Over Four Electric Plants

Another answer to the undesirability of developing hydroelectric power possibilities in mountain regions where coal is available is given in the recent action of Troy, Graham & Company, Chicago bankers, in purchasing a number of privately owned electric companies in northwestern Colorado and organizing them into the Colorado Utilities Corporation.

The electric plants at Craig, Hayden, Oak Creek and Steamboat Springs have been purcnased and a large central generating plant of 30,000-kw. initial capacity will be built at Mount Harris, the biggest coal center of the region, to replace the individual steam generating units. The preliminary investment is understood to be about $500,000.

The company has been incorporated in Denver with Douglas Graham, S. A. Graham and L. J. Knauf as organizers and Irving W. Durfee of Chicago handling the legal details. While Troy Graham & Company, backers of this proposition, have operated a number of smaller utility chains in the Middle West this is their initial entry in the Mountain region.

New Warehouse to Be Built by Edison Company at Lindsay

Work is to begin immediately on a new $36,000 warehouse and garage to take care of the needs of the Lindsay territory of the Southern California Edison Company. This warehouse and garage, which is to be a one-story structure, 95 ft. x 105 ft., is to be located at the corner of Tulare Street and Blue Gum Avenue. It will have reinforced concrete floors and reinforced concrete walls up to window height, then structural steel frame with steel sash and corrugated iron siding and roof. Present plans call for the completion of this structure about July 1. In keeping with the company's general policy, the grounds will be laid out with lawn and shrubs.

This warehouse is but one of thirty-four similar establishments which serve as contact points for the tremendous and highly involved general store system, which must be maintained by the Edison company to meet the demands put upon it by the rapid growth of the communities in which it operates.

High Line Completed Through City by Portland Company

Connecting its principal steam plant with its main receiving station for hydro power in the city of Portland, supplementing the low-tension ties already existing, the Northwestern Electric Company recently has completed a 66,000-volt tie line through the city. The line, approximately five miles in length, runs from the Albina substation on the east side generally south through residential and business districts to a point on the Willamette River opposite the lower end of Ross Island, where it crosses the river on two long spans, thence doubling back on the west side to the Lincoln Street steam plant.

The lead, which is of single wood poles averaging seventy-five feet in length, is designed to carry a possible two circuits, though at the present time only one is installed. Conductors are 336,400 circ.-mil., standard aluminum, steel-cored cables, giving a capacity of 30,000 kva. to the circuit. Pin-type insulators are used throughout except at strain points, where five-unit suspension insulators are used, and on the river crossing where the suspension insulators contain seven units.

The river crossing is supported by three steel towers, a dead-end tower on each shore and a supporting tower on Ross Island near the center of the crossing. On the supporting tower the conductors are suspended on a movable trolley device to permit them to roll free. The east strain tower is 107 ft. high and the other two are 175 ft. high. This provides a minimum vertical clearance of the conductors above low water of 123 ft., as required by the war department. The east span is 1,052 ft., and the west span, 1,133 ft. long. The line, exclusive of switching and transformation equipment at either end, cost about $155,000.

Chelan Electric Company Starts Work on Power Station

Actual construction work has begun on the Chelan power station for The Washington Water Power Company, which is arranging to take over the Chelan Electric Company in whose name the development is being made. (Journal of Electricity, Oct. 1, 1925, p. 263.) Grant Smith & Company, who have charge of the construction, are working on a schedule which calls for the first installation of equipment for about 35,000 hp. in 1927. An ultimate installation of about 125,000 hp. is provided in the Chelan plans.

The permit granted by the Federal Power Commission to the Chelan Electric Company, which is a subsidiary of the Great Northern Railway Company, contains several unusual features. The Chelan station must be interconnected with The Washington Water Power Company's transmission system, giving the six present stations of The Washington Water Power Company on the Spokane River the bulk of the summer load. This is provided in order to permit the Lake Chelan reservoir to be at a high level during the tourist recreation season at the lake.

A dam will be constructed near the mouth of Lake Chelan, and tunnels will be built to the station four miles below where the short Chelan River empties into the Columbia River. The permit specifies that the lake reservoir may be raised 7 ft. above the normal high water level of the river but may not be lowered then more than 4 ft. in the tourist season until after Aug. 15 when a heavy irrigation pumping load is anticipated. It is estimated that the raise of the lake 7 ft. will provide an additional storage of 200,000 acre-ft., and that between the maximum and minimum levels provided about 680,000 acre-ft. of water will be available.

Running at full capacity the station may use 2,000 ft. of water except that between April 1 and Aug. 15 only 1,000 ft. may be used unless the lake is within 4 ft. of maximum high water. A 4-ft. fluctuation is allowed during the summer months, although it is expected that not more than 3 ft. will be used in average seasons. No limit is set on the rate water is drawn off after Aug. 15, provided the minimum level is not passed.

Preliminary Work Started on Mokelumne River Project

Preliminary construction work has been started by the Pacific Gas and Electric Company on its Mokelumne River project. (Journal of Electricity, Feb. 15, p. 157.) Crews of men are moving in for the construction of approximately fifty miles of power line from the Electra power house located near Jackson, Calif., to the Salt Springs dam site. This line will serve temporary power for the construction work. Twenty-five miles of road are to be built, taking in part of the old road running into Tiger Creek Mill site.

The Mokelumne River development involves the construction of a 213-ft. dam on that river at Salt Springs, approximately four miles upstream from the junction of the Mokelumne with its principal tributary, the Bear River. The water impounded will create a reservoir of 60,000 acre-ft. capacity. From an intake at the dam the water will be conveyed by a concrete-lined canal and tunnel for a distance of 25 miles to Tiger Creek. At this point the water will be dropped 1,200 ft. through penstocks to operate a new power house with an installed capacity of 47,000 hp. The water will be carried from the Tiger Creek power house to the company's Electra power house where it will be used further for the generation of electric energy, increasing the output of the Electra power house which has now an installed capacity of 26,810 hp.

Bondholders Dispose of Steam Plant Formerly Part of Colorado Springs Light, Heat & Power Company's System.—The bondholders of the Colorado Springs Light, Heat & Power Company whose electric plants and lines were taken over for operation by the municipality (Journal of Electricity, June 15, 1925, p. 597), have disposed of the steam plant left on their hands. It has been sold to W. A. Otis, formerly president of W. A. Otis & Company, who in association with Charles Sutton of Colorado will equip the plant for the manufacture of special hard steel for high-speed tools.

Southern Sierras Company to Add to San Bernardino Plant

Construction is to start at once on a $500,000 addition to the San Bernardino plant of The Southern Sierras Power Company, between Mill street and the Santa Fe tracks.

The new building will house a new 15,000-kva. condenser, and will provide space for a second condenser of the same capacity. It will be of steel frame, reinforced concrete, with a ground area 60 ft. by 75 ft., 40 ft. high, with a longitudinal basement half the width of the building. One-half will be occupied by the big condenser and overhead crane; the other half, separated from the condenser room by a partition running lengthwise of the building, will contain the basement into which the cables will run; ground floor, oil circuit breakers; second floor, bus and conduit room; third floor, operating room.

The new condenser unit is the forerunner of others to follow, the last wall of the building housing it being of semi-temporary construction to facilitate future expansion. Besides the condenser other equipment ordered for this location includes three 5,000-kva. transformers to furnish increased transformer capacity for the Imperial Valley line, and three other 5,000-kva. transformers to supply the synchronous condenser; new high-tension bus structure which ultimately will supplant that at present in use, and a new bus structure for the 88,000-volt service for the Imperial Valley line.

Ellensburg, Wash., Considers Puget Sound Company Offer

The city of Ellensburg, Wash., is considering a proposition from the Puget Sound Power & Light Company to supply the needed power for the municipal power plant at a figure which it is claimed would cost the city less than to provide power by the installation of Diesel engine equipment. The proposition was informal and comprised three suggestions. One was that the company furnish the amount of power the city would require and to make installations of line and substations to supply the city for $1.25 a horsepower per month plus a graduated rate per kilowatt, starting at nine mills and graduated down to six and a quarter mills on contract for ten years, with the provision permitting the city to cancel it in five years.

A second proposition was for the power company to pay the city a flat amount for a lease on the municipal system on the basis of its net revenue and to furnish power for pumping at its present cost, the company to give the city the option of canceling the lease at any time there was any increase in rate. The company also agreed to give the consumers an immediate reduction of 10 per cent in lighting rates.

The third plan offered was for the company to purchase the plant, the company agreeing to do that at any time the city so desires, if the city in the meantime leases the plant to the company. Under the purchase agreement the power company agreed to reduce the lighting rates 16 per cent, the price to be agreed upon at time of purchase. The city has taken all three propositions under consideration.

Two Construction Projects on Sacramento River Islands

The Great Western Power Company of California has undertaken two large construction projects in the island territory of the Sacramento River, according to a statement from Marvin Curtis, Jr., manager of the Rio Vista district of the company.

Work has just been completed on a 22,000-volt line on Sherman Island, 13 miles in length, which will serve 2,200 hp. to the Longview Dredging Company near Rio Vista. The dredger will be engaged for the next eighteen months in moving thousands of yards of material in connection with the flood-control program on the Sacramento River. The extension of the company's lines was made at a cost of $50,000, and it also will serve the purpose of tying in the Isleton and Antioch substations, strengthening the service in that vicinity.

The Great Western Company also plans to start immediately the construction of its new Isleton substation, which will be located on Grand Island near the town of Ryde. This substation will be one of the most modern of its kind, completely automatic in operation, and will have an installed capacity of 9,000 kw. in transformer equipment. Electric service in the island territory will be augmented by the interconnection of the Isleton substation with the two large substations at Brighton, near Sacramento, and Antioch. The cost of this plant is placed at $206,000, and it is expected to be in operation by August of this year.

San Francisco Graybar Employees Win Majority of Prizes

Three out of five of the monthly contests run in Western Electric News have been won by employees of the San Francisco Graybar organization. For the best answer to a question selected by the editorial board the Graybar Electric Company and the Western Electric Company offer a $25 prize. The contest is open to all of the 50,000 employees of the two organizations.

With an employee force of but 400 in the San Francisco branch house, which includes the Oakland store and Emeryville shop, three of these prizes have been won by members of the San Francisco division. C. L. Huyck was the winner of the first contest, giving the best answer to the question, "What is success?" (See Journal of Electricity, Nov. 1, 1925, p. 318.) Mrs. Betty Webster won the next, with an an answer to "What does the telephone mean to human progress?" Edith G. Shapirer was winner of the contest on "What is wrong with the younger generation, if anything?"

Utah Employee Awarded Insull Resuscitation Medal

Charles Catron, an employee of the Utah Power & Light Company, at Idaho Falls, Idaho, recently was awarded the Insull medal which is offered to public-utility employees who save human life through the use of the Schaefer prone-pressure method of resuscitation. Presentation of the medal was made by George R. Horning, vice-president and general manager of the Utah Gas & Coke Company, as Mr. Insull's representative. The ceremony was the outstanding feature of the first morning session of a two-days' conference of division superintendents and line foremen of the Utah Power & Light Company, which took place at the general offices of the company in Salt Lake City.

Mr. Catron's heroic act was performed on March 4, 1925, when George Denning, a farmer living near Iona, Idaho, assisted by his brother, attempted to hoist a "T" derrick under an 11,000-volt distribution line. Two iron guy wires attached to the top of the boom came in contact with the 11,000-volt line, transmitting the current through Mr. Denning's body and knocking him to the ground. With unusual presence of mind his brother removed a rubber from his shoe and with this jerked the iron wires from Mr. Denning's hand. He then was

CHARLES CATRON

picked up, apparently lifeless, and carried to his mother's residence some 200 ft. away.

Mr. Catron, local troubleman for the power company, happened to be in Iona reading meters at the time of the accident. Learning of the trouble he immediately drove over, saw evidences of an accident, and rushed to the victim's house. He found Mr. Denning in a chair, wrapped in blankets, unconscious and not breathing. Mr. Catron placed the victim on the floor and began the prone-pressure method of resuscitation. In fifteen minutes Mr. Denning resumed his breathing.

Mr. Catron has been in the employ of the Utah Power & Light Company for about three years. Previous to that time he was a regular employee of the Shelley Light & Power Company at Shelley, Idaho. Application for the medal in recognition of his successful effort in saving a life was made by Markham Cheever, general superintendent and chief engineer of the Utah Power & Light Company.

Utility of Lander, Wyo., Adopts Merchandising Policy.—The Lander (Wyo.) Electric Light & Power Company is the latest central station in the Rocky Mountain region to announce its conversion to a policy of merchandising. New shelving and counter displays now are being arranged as part of the building renovation plan. It is understood that a model electric shop is planned by this Wyoming central station.

Patent Infringement Suit Won by S. Morgan Smith Company

The suit brought in the district court of the United States for the northern district of Georgia by the Allis-Chalmers Manufacturing Company against the Columbus Electric & Power Company for the use of plate steel scroll cases which were alleged to infringe the W. M. White U. S. patent No. 1076617, issued Oct. 21, 1913, has been decided in favor of the defendant. The defense was assumed by the S. Morgan Smith Company, manufacturers of the plate steel scroll cases, thus holding the users harmless. The defenses were principally invalidity of the patent for want of invention and novelty, and non-infringement. The patent covers scroll cases for water wheels, pumps and blowers made of sheet metal sections, the surfaces of which can be generated by straight line generatrices or the lineal elements of which in the direction of flow are straight.

In the opinion handed down by the court grave doubt is expressed whether any patentable novelty really exists but such doubt is given in favor of the patent and it is allowed to stand. The decree holds that the scroll cases as built and formed by the S. Morgan Smith Company obtain the advantages of the smooth flow of the true spiral casing and do not infringe the patent.

To Relight Main Business Street in San Diego

Contract soon will be let for the relighting of Broadway, San Diego's main business street, from Third to Eighth Streets, it was announced by the city council there recently.

The standards are to be of cast iron and pressed steel and have a mounting height of 20 ft. to light center. They are of the two-light design and are to be reinforced with a 5-in. OD casing which extends from the bottom of the foundation to the arms of the standard. There will be two 10,000-lumen lamps mounted on each standard, and the standards are staggered so that there will be a standard every 46 ft. of street. This means a lighting intensity of 435 lumens per linear foot of street. Refractors are mounted in each lighting unit, which will make for an efficiently well-lighted street.

Considerable semi-business district lighting is going on in San Diego at this time. University Avenue from Third to Park Boulevard, a distance of one mile, and two blocks on Fourth and Fifth Streets will be lighted within the next few days. In this district there will be 110 single-light standards with a mounting height of 16 ft. to light center and equipped with 4,000-lumen lamps. The standards are to be staggered at 60 ft. intervals. Approximately six miles of this type of lighting is contemplated for other semi-business districts and contracts for installation will be let within the next ninety days.

To Build Electric Planing Mill.—A new electric planing mill to cost between $75,000 and $100,000 will be added to the lumber plant of the Schafer Brothers mill at Montesano, Wash. The plant will employ 80 men.

News Briefs

Hydro Plant for Colorado Prison.—A small hydro power plant has been put in operation by the Colorado state penitentiary, west of the prison at Canon City, Colo., on the Arkansas River, to accommodate the requirements of its newly installed automobile-license-plate manufacturing plant which was authorized at the last session of the legislature in that state.

Geyser Steam for Power Plant in Japan.—An experimental plant to utilize steam from a geyser has been completed recently at the hot springs of Beppu, Japan, according to Denkinotomo, Japanese electrical magazine. A low-pressure turbine of 3-hp. capacity was installed coupled to a 1.5-kw. electric generator. The plant was installed by the Tokyo Electric Light Company, and experiments as to the operating characteristics of the plant will be carried on for research purposes.

Japanese Fertilizer Company Plans Power Project.—The Nippon Nitrogen Fertilizer Company is contemplating the development of a large hydroelectric power project at Chosen, Japan, on the Choshiko River, according to Denkinotomo. At a head of 2,000 to 3,000 ft. the company plans to develop an initial capacity of 80,000 kw., which will be increased in the future to 120,000 kw. through the erection of a dam. The total cost of the project is estimated at $12,000,000 (24,000,000 yen). Part of the power developed will be used in connection with local irrigation.

Alouette Development. — Scheduled progress is prevailing on the Alouette development of the B. C. Electric Railway Company, Ltd. The storage dam raising the level of Alouette Lake, the tunnel to carry the waters of that lake through the mountain to Stave Lake, and the transmission line from the Stave Falls plant to the site of the Alouette plant all are completed now. Work on the Alouette power house will be commenced shortly, a cofferdam to be constructed immediately and excavation work to be started in the fall. The plant is expected to be ready for operation in the fall of 1927.

Los Angeles Bureau of Power and Light Enlarges Substation.—Work on an addition to a distribution substation of the Bureau of Power and Light of Los Angeles, located at Avenue 61 and Monte Vista Street, has been started. The present substation has a capacity of 3,000 kw. This new work will add 12,000 kw., bringing the total capacity to 15,000 kw. The outside dimensions of the addition will be 40 by 80 ft. and the structure will be one story high. The building is to be steel frame with a stucco finish, and it is expected to be ready for operation in June of this year. Present estimates place the cost of the addition to the station at $75,000.

Puget Sound Company Secures 50-Year Franchise for Lines on Wenzell Road, Washington.—The commissioners of Grays Harbor County, Aberdeen, Wash., have granted to the Puget Sound Power & Light Company a fifty-year franchise for running light and power lines on the Wenzell road near Elma. The power company also has applied to the town council of Pe Ell, Wash., for a franchise to furnish light and power to the town.

Bureau of Power and Light, Los Angeles, Establishes New District Headquarters for Work Crews.—Work crews employed in the western and northwestern sections of Los Angeles by the Bureau of Power and Light have moved into new district headquarters at the corner of Hoover and Clinton Streets. The new quarters include a headquarters building, a two-story storehouse, and a large enclosed storage yard, which were completed at a cost of $175,000. Power-bureau estimates figure the annual economies to be effected in time saved by this centrally located headquarters at $15,000.

Coast Counties Gas & Electric Company Elects Officers.—At the annual meeting of the stockholders of the Coast Counties Gas & Electric Company, Santa Cruz, Calif., held in San Francisco recently, the following directors were re-elected: R. L. Cardiff, S. Waldo Coleman, J. D. Grant, W. O. Jeter, C. K. McIntosh, C. C. Moore and Ferdinand Reis. Officers were re-elected as follows: president, S. Waldo Coleman; first vice-president, J. D. Grant; second vice-president, W. O. Jeter; secretary and treasurer, W. W. Kamm; assistant secretary and assistant treasurer, P. C. Mahncke.

Mount Spokane Power Company Buys Small Utility.—Purchase of the holdings of John Kulzer, operating a small electric service company at Valley and Kulzer, Wash., north of Spokane, by the Mount Spokane Power Company for an approximate consideration of $75,000 recently was announced by Mark F. Mendenhall, Sr., president of the Mount Spokane company. A small hydroelectric plant was taken over and a transmission line now is being built to connect the Kulzer system with the general organization of the Mendenhall property.

To Survey Five-Mile Rapids Power Project at Burbank, Wash.—Department of conservation and development at Olympia, Wash., has commissioned Fred Appleby, civil engineer of Tacoma, to make a survey of the Five-Mile Rapids power project, at Burbank, Wash., where the Burbank Irrigation District owns and operates a power canal and plant developing 1,000 hp. electric energy, used for pumping water from the Snake River upon 5,000 acres of district lands. Directors and bondholders of the district believe that the power development may be increased to a minimum of 2,000 hp., and a possible maximum of 20,000 hp. The state department of conservation is interested directly as the owner of $44,000 bonds of the Burbank Irrigation District and $142,000 bonds of the Franklin County Irrigation District, which would be served by the increased power.

Application for Diversion of Water from Smith River, California.—C. Romander, whose address is given as in care of James Davis, district attorney, Crescent City, Calif., has filed application to divert 300 sec. ft. of water from the South Fork of the Smith River, tributary to the Smith River, for a power project estimated at $300,000.

Pacific Gas and Electric Company Buys Middle Yuba Company.—The Pacific Gas and Electric Company, San Francisco, has purchased the Middle Yuba Hydroelectric Company, which operates a distributing system from Alleghany, Calif., to Pike City, a distance of about 12 miles, with numerous feeders to mining properties, for $65,000. The deal recently was authorized by the California Railroad Commission. The offices of the Middle Yuba Company were in Grass Valley, Calif.

New Distribution Substation Completed by Los Angeles Utility.—The Los Angeles Gas and Electric Corporation has completed a new distribution substation (16,000/2,200-volt) at Tenth and Santee Streets, Los Angeles. The present installation will care for 5,000 kw. a.c. and 1,000 kw. d.c., but the ultimate capacity of the station will be three times as great. Because of the increasing difficulty of getting through the streets of Los Angeles with additional feeder lines, this station has been so constructed as to permit of operating it at 33,000 volts when the load necessitates it. Total cost of the new station will approximate $250,000.

Seattle Electric Club to Issue Membership Directory.—The board of directors of the Electric Club of Seattle has undertaken the compilation of a small vest-pocket directory of the membership, giving the addresses, telephone numbers, business connections and a list of the merchandise distributed. This is intended to acquaint each member of the club with the business activities of his fellow members, and the directory will be published first in an issue of the club's paper, R. P. M., and later made into a small pocket directory. Secretary P. L. Hoadley is mailing questionnaire post cards to each member, asking for full information relative to his business connections.

Consider Establishment of Rules for Removing Public Service Poles.—The representatives of the Municipal Light and Power Department, of the city of Pasadena, Southern California Edison Company, and the telephone company recently met with R. V. Orbison, city manager, and James H. Howard, city attorney, for the purpose of considering the establishment of rules governing the removal of public service poles on the streets. The city is seeking to determine whether individual property owners can bring about pole removals in front of their premises without paying the cost of such work. Mr. Howard said it is likely as a result of this conference that the regulations to be adopted will be put in the form of an ordinance and introduced at an early session of the Board of City Directors.

Pacific Coast Electrical Association

Plans and Committee Personnel for Annual P. C. E. A. Convention Announced

E. R. Northmore, general convention chairman, and his committee are making brave plans for the annual convention of the Pacific Coast Electrical Association, which is to be held in Los Angeles June 7-11, inclusive. While all details have not been worked out, yet the general outline has so far developed as to give a good idea of what is in store.

The sixteen-day summer excursion rate will be in effect on the railroads for the advantage of those who come by rail. Return tickets under this rate may be purchased from all points to Los Angeles at slightly less than one and one-half fare.

The Los Angeles Biltmore Hotel has been secured as convention headquarters. The general sessions will be held in the music room, while the ball room will be available for all purposes requiring larger capacity. Facilities are available for the smaller groups, such as Section and committee sessions. The opening activity will be the registration of delegates on Monday afternoon, June 7. The evening of the same day will be devoted to informal dancing.

Program

The mornings of June 8, 9, 10 and 11, will be devoted to general sessions. The various section chairmen should prepare a list of such subjects of general character as may be of interest to the organization as a whole, together with the time required for presentation, and submit to R. A. Hopkins, program chairman, 420 South San Pedro Street, Los Angeles, for possible inclusion in the program.

Parallel sessions of the various sections and committees are scheduled for the afternoons of the 8th and 9th. Section chairmen are requested to prepare their program in as much detail as possible, including the hour and time alloted to each subject. This information should be in the hands of Mr. Hopkins as soon as possible.

Entertainment

There will be dancing at the Biltmore every evening. Monday, Wednesday and Thursday evening will be more or less informal, with the formal president's reception and ball on Tuesday evening. There will be dancing and entertainment following the banquet on Friday evening. Facilities for golfing will be available at the fifteen golf courses within a half hour's ride of Los Angeles. Automobiles will be provided for drives.

Especial plans are being made for the entertainment of the ladies. Mrs. Baurhyte and the ladies of the executive committee will entertain at tea at one of the country clubs. The privileges of the Edgewater Club at Ocean Park Beach will be at command, with ocean bathing, salt water plunge, luncheon and bridge. An afternoon of golf and another of touring the motion picture studios also is in store for the ladies.

On Tuesday the convention will meet with the Los Angeles Electric Club for luncheon in the Biltmore ballroom. S. E. Gates, president, and his coworkers in the Electric Club are preparing for one of the star events of the convention.

H. M. Crawford, chairman of the Commercial Section, is preparing two very interesting numbers for the general sessions. The cooking and heating committee and the lighting committee each will report, with apparatus to illustrate their recommendations.

Complete Committee Personnel

The complete roster of the various convention committees follows:

General convention chairman—E. R. Northmore, care Los Angeles Gas & Electric Corporation, Box 1100 Station C, Los Angeles, Calif.

Reception committee—W. L. Frost, chairman, and Mrs. Frost, Mr. and Mrs. William Baurhyte, Mr. and Mrs. Samuel H. Taylor, Mr. and Mrs. F. A. Leach, Jr., Mr. and Mrs. Frank E. Boyd, Mr. and Mrs. F. H. Woodward, Mr. and Mrs. A. E. Holloway, Mr. and Mrs. F. O. Dolson, Mr. and Mrs. A. M. Frost, Mr. and Mrs. D. E. Harris, Mr. and Mrs. J. C. Rendler, Mr. and Mrs. C. T. Hutchinson, Mr. and Mrs. C. E. Heise, Mr. and Mrs. P. M. Downing, Mr. and Mrs. A. B. Day, Mr. and Mrs. S. Waldo Coleman, Mr. and Mrs. James F. Pollard.

Registration and attendance committee—E. H. Jones, chairman; S. C. Haver, Harry Fogwell, H. H. Ranlett, J. C. Kerr, Al May, H. H. Courtright, H. L. Caldwell, Harold Thrane, F. H. Woodward, O. B. Lyman.

Hotel committee—C. A. Kelley, chairman; J. L. Gray, Don C. Ray, G. P. Mackenzie, F. E. Dellinger, A. W. Copley, Ross L. Mahon.

Program committee—R. A. Hopkins, chairman; R. R. Cowles, H. M. Crawford, D. L. Scott, Frank W. Smith, H. Dewes, C. D. Wiese, W. G. McWhinney, H. H. Cox.

Entertainment committee—K. E. Van Kuran, general chairman; Golf—G. E. Arbogast, chairman; P. H. Booth, W. L. Frost, C. E. Listenwalter, H. F. Boardman, Garnett Young, H. E. Sanderson, W. S. Berry, J. L. Phillips. President's reception and evening entertainment—L. C. LaMont, chairman; Herbert Dewes, W. H. Talbott, Miles F. Steel, Frank Weiss, Ray Carruthers, W. A. Knost. Ladies' entertainment—P. H. Booth, chairman; Mrs. W. L. Frost, vice-chairman; G. E. Arbogast, Harry L. Harper, R. J. McHugh, W. P. L'Hommedieu, D. E. Harris, Don C. Ray, Mrs. A. B. Day, Mrs. S. E. Gates, Mrs. H. H. Walker, Mrs. E. H. Jones, Mrs. C. E. Heise, Mrs. R. E. Fisher, Mrs. S. Waldo Coleman.

Transportation committee—Harry L. Harper, chairman; Geo. F. Miller, R. C. Powell. Local transportation committee—P. H. Ducker, C. O. Hutchings, W. J. Schaeffer, J. M. Wainscoat, C. D. Weise, S. B. Shaw, E. V. Kane, J. H. Cunningham.

Electric Club luncheon committee—S. E. Gates, chairman; Roy Lockhart, F. J. Airey, S. W. Scott, O. L. Moore, J. E. Macdonald.

Banquet committee—R. E. Smith, chairman; J. G. Loomer, W. A. Knost, P. P. Pine, George Bigelow.

Finance committee—O. L. Moore, chairman; B. T. Story, J. A. Cannon, H. T. Terry.

Publicity committee—D. L. Scott, chairman; C. L. Burgess, H. K. Griffin, J. Chas. Jordan, F. S. Myrtle, James F. Pollard, M. W. Scanlon, F. Z. Stone, W. A. Cyr, Forrest M. Raymond, S. W. Green, H. E. Jones, Al. C. Joy, C. H. Peirson, E. P. Ramsay, R. E. Smith, George C. Tenney, Ben S. Allen.

Special Trains Are Planned for Western N.E.L.A. Delegates

Accommodations in special cars for Western delegates to the N.E.L.A. convention in Atlantic City, May 17-20 are being arranged for so that delegates may join and proceed to the convention from the West in a a body. F. M. Carroll, agent for the Chicago & Northwestern Railway, is making up the arrangements and has outlined the following data concerning the special cars. Delegates wishing to attend the convention via these arrangements are asked to write immediately to Mr. Carroll, at 301 Monadnock Building, San Francisco. He will then have a representative of the railway call upon those planning to go, and make individual arrangements with them for their pullman and other accommodations.

Following is the itinerary:

Seattle. Special car leaving **Seattle**, Union Pacific Railway, 11:15 p. m., **May** 11, arrives **Portland** at 6:15 a. m., **May** 12, and leaves there 9:35 a.m. This car arrives in **Boise, Idaho,** 5 a.m., May 13, and meets other specials from Spokane, Los Angeles and San Francisco, at **Green River,** 8:40 p. m., May 13.

Spokane delegates may leave on a special Union Pacific, which leaves 9:10 a. m., **May** 12, which arrives at **Ogden,** 7:05 a. m., and leaves 7:20 a.m., **May** 13, thence to **Salt Lake City,** arriving at 8:15 a.m., May 13. This train will join the others at **Green River, May** 13.

Los Angeles special car leaves, Union Pacific, 10:51 a.m., **May** 12, arriving at **Salt Lake City,** 12:23 p.m., **May** 13, leaving there 1 p.m., arriving Ogden, 1:55 p.m., **May** 13, and leaving 2:35 p.m., arriving at Green River 8:55 p.m., May 13. It leaves Green River 9:05 p.m., arrives Chicago on Chicago & Northwestern at 8:55 a.m., May 15.

San Francisco special leaves Southern Pacific, 11:00 a.m., **May** 12; arrives **Ogden,** 2:05 p.m., **May** 13, transfers to Union Pacific at Ogden, leaving 2:35 p.m., **May** 13. Arrives at Chicago via Chicago & Northwestern 8:55 a.m., **May** 15.

All trains are to consolidate at Chicago, and be routed over the Pennsylvania to Atlantic City, arriving there **May** 16, the morning prior to the opening of the convention.

Advertising Section Changes Meeting Date.—The meeting of the Advertising Section, which has been scheduled for April 30, has been changed to April 23. It will be held in San Francisco.

A.I.E.E. News

San Francisco Section. "Engineering Education" is to be the subject of the address to be delivered by Prof. H. H. Henline of Stanford University at the next regular meeting, Friday, April 23, 1926. The meeting will be held at the Engineers Club, 57 Post Street, San Francisco, at 7 p.m.

Engineering Societies Employment Service has established a branch office in San Francisco at 57 Post Street, Room 715, for the benefit of Pacific Coast engineers. It is urged that all Pacific Coast engineers patronize this new office as fully as possible in order that its establishment may be justified and its continuity assured. N. D. Cook is the manager of the San Francisco branch office.

News of the Electragists

"Let the Code Decide," Slogan of Inspectors

Program Discussed by California Association of Electrical Inspectors Has Significant Meaning

"Let the Code Decide" was adopted as the slogan of the California Association of Electrical Inspectors at its fifth semi-annual meeting which was held in the San Diego Hotel, San Diego, March 22-24. This slogan sums up the outstanding subjects before the convention, standardization and uniform interpretation.

President R. W. Abright, city electrician at Long Beach, presided. John L. Bacon, mayor of the city of San Diego, welcomed the delegates to the city. In his address Mayor Bacon emphasized the service an owner receives for the money he spends for municipal inspection fees. He urged that an effort be made to bring about a better understanding between the public and the municipal authorities, to sell the public the idea of inspection, and to establish a uniformity of inspection. In his address President Abright spoke of the vital interest of the work of the association to the electrical industry, and the need of co-operation between all branches. He stressed the value of establishing a code of ethics within the industry. Mr. Abright also spoke of the need of uniform interpretation of the Code throughout the West. He urged all inspectors to render courteous, efficient service at all times.

Constitutional Changes

The Articles of Association of the organization were changed to provide for the holding of annual meetings only instead of semi-annual meetings; the annual meeting will be held in March.

A new class of membership to be known as "supporting" was established. Any person, firm or corporation interested in the objects of the Association may become a supporting member with annual dues of $10 per year.

"The Northwest Association of Electrical Inspectors" was the subject of a talk by the secretary-treasurer of that organization, F. D. Weber, chief electrical engineer of the Oregon Insurance Rating Bureau, Portland, Ore. Mr. Weber presented some statistical data on the association, and also urged that the proceedings of the Northwest Association of Electrical Inspectors and the California Association of Electrical Inspectors be published jointly in order that the members of each organization might have the proceedings of both organizations.

L. W. Going, chief electrical inspector, Portland, Ore., and president of the Northwest Association, extended the greetings of that organization. He stressed the need of establishing uniform methods of inspection and uniform interpretation of the Code. Mr. Going stated that local pride was the greatest stumbling block in the way of bringing about a national standard.

H. A. Patton, electrical inspector of the Washington Surveying and Rating Bureau, Seattle, Wash., and a member of the executive committee of the organization, outlined the history of the Northwest Association. He emphasized the necessity of having a large attendance at the conventions of the organizations in order to accomplish the greatest results and to build up prestige. Mr. Patton urged that representatives from each of the Pacific Coast electrical inspectors' associations be present at the conventions of the other. He also suggested that joint committees work on the problems of standardization, the universal need in the West.

C. W. Mitchell, B. C. Hill and R. H. Manahan were appointed as a standardization committee to work with a similar committee from the Northwest Association.

The afternoon session was opened with an address by F. M. Downer, city attorney of San Diego. He discussed the authority and power invested in city electrical inspectors in enforcing ordinances. He particularly discussed the question of validity of city ordinances which include the National Electrical Code and the State Safety Orders as part of the ordinance. In his opinion such a provision would be upheld in the courts.

"The Attitude of Public Utilities toward the Electrical Inspector and His Work" was the subject of a paper presented by E. J. Crawford, assistant general superintendent, San Joaquin Light & Power Corporation, Fresno. In this paper Mr. Crawford showed that inspection is essential; that it is naturally a function of the local government; that the various codes and rules for guidance are not necessarily the last word in construction; and that the inspectors should be broad-gaged men who should interpret the various regulations with the intent of the law in mind.

Delegates in attendance at the convention of the California Association of Electrical Inspectors which was held in San Diego March 22, 23 and 24.

W. F. Brainerd of the California Electrical Bureau, Los Angeles, outlined the Red Seal plan. He presented some history of the Bureau and its position in the electrical industry. In summing up the value of the Red Seal on a home he said it assures the owner that his electrical installation is not only safe from hazard but also that it is adequate.

"Promoters of Public Welfare—The Code—The Inspector" was the subject of a paper by W. J. Canada, electrical field secretary of the National Fire Protection Association, New York City. This was read by C. W. Mitchell at the Tuesday morning session in the absence of Mr. Canada. Mr. Canada outlined the history of the National Electrical Code. He expressed the desirability of having one standard, eliminating local codes and rules. The need of a unified national association of electrical inspectors was treated in the paper.

In the absence of H. H. Walker of Los Angeles, president of the California Electragists, C. J. Geisbush, executive secretary of that organization, spoke on the attitude of the electrical contractor toward the electrical inspector. He expressed the belief that the contractors were willing to co-operate with electrical inspectors. He suggested that meetings on code and ordinance interpretations be held between the city inspection department and the contractors, citing the good which such meetings already have accomplished in Los Angeles (Journal of Electricity, Nov. 1, 1925, p. 342), and also in San Diego. The question of licensing and bonding also was discussed.

"Electrical Accidents in Industrial Plants, Statistical Data, Precautionary and Preventative Methods" were discussed by George E. Kimball, electrical engineer, Industrial Accident Commission of California, San Francisco. Although the Safety Orders of the Commission apply primarily only in places of employment, they have been included as part of the ordinance of many cities to apply in all installations. Mr. Kimball read a number of accident reports received by the commission which pointed out the necessity of using every precaution possible. In nearly every case the accident might have been prevented if proper guarding and grounding had been provided. The hazards existing in temporary wiring installed in buildings during the course of construction were emphasized, especially wiring for concrete mixers and similar equipment.

"Non-Metallic Sheathed Cable" was discussed by F. E. Downing of the Rome Wire Companying, Chicago. He presented the history of its development and the rules for its installation recently adopted by the Electrical Committee of the National Fire Protection Association (Journal of Electricity, March 15, 1926, p. 229).

Due to the amount of work before the convention it was necessary to hold an evening session. This session was devoted primarily to discussion of the more important changes in the rules of the National Electrical Code as contained in the 1925 edition. These were first presented by James M. Evans, electrical engineer, District C, Board of Fire Underwriters of the Pacific, Los Angeles. Single-pole fusing and grounding provisions were the outstanding changes which were discussed.

Changes in Rules of the National Electrical Code adopted by the Electrical Committee of the National Fire Protection Association at its meeting in New York City, Feb. 18, 1926, (Journal of Electricity, March 15, 1926, p. 229), were discussed by C. W. Mitchell, electrical engineer, Board of Fire Underwriters of the Pacific, San Francisco. Mr. Mitchell stated that these rules must be approved by the National Fire Protection Association, which meets in May, and then by the American Engineering Standards Committee, which meets in September, before they become a part of the National Electrical Code.

The report of the National Electrical Code Committee of the California Association was presented by R. W. Abright. The function of this committee is to receive suggestions relative to proposed changes in the Code from inspectors or anyone in the electrical industry, put them in the proper form and submit them to the Code committee of the National Fire Protection Association for approval. Suggestions may be sent to any one of the members of the California Committee: F. A. Morrell, city electrician, Stockton; H. W. Stitt, city electrician, Fresno; R. W. Abright, city electrician, Long Beach; C. W. Mitchell, electrical engineer, Board of Fire Underwriters of the Pacific, San Francisco; and C. E. Hardy, chief, Department of Electricity, Oakland.

B. C. Hill, Oakland, reported for the universal ordinance committee. The report included a questionnaire which had been sent out by the committee and the results that had been obtained. A large majority of those who replied to the questionnaire considered a universal ordinance desirable. Further work will be done by this committee and an effort made to bring about the adoption of a uniform ordinance.

The subject of allowing an electrical wireman's license to be transferable between cities was discussed.

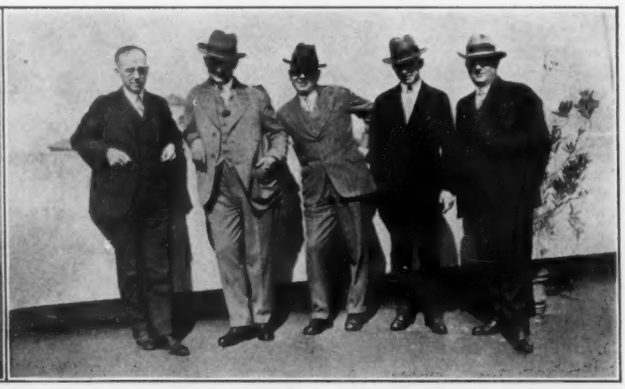
Questions which had been submitted by members were answered from the floor. Most of these dealt with the Code and the Safety Orders.

The following men were elected to honorary membership in the association: J. Emerson, formerly city electrician, Vallejo, Calif.; L. W. Going, Portland, Ore., president of the Northwest Association of Electrical Inspectors; F. D. Weber, Portland, Ore., secretary-treasurer; H. A. Patton, Seattle, Wash., executive committeeman of the same association; and Thomas E. Lee, Seattle, Wash., International Brotherhood of Electrical Workers.

The officers elected at this meeting were: president—B. C. Hill, supervisory inspector, Oakland; vice-president—R. H. Manahan, city electrician, Los Angeles; secretary-treasurer—C. W. Mitchell, electrical engineer, Board of Fire Underwriters of the Pacific, San Francisco. Executive committee: R. W. Abright (active), city electrician, Long Beach; V. W. Hannum (active), electrical inspector, Anaheim; W. H. Talbott (associate) San Diego Consolidated Gas & Electric Company, San Diego; Arthur Kempston (industrial), Majestic Electric Appliance Company, San Francisco; and Leon Shook (supporting), International Brotherhood of Electrical Workers, San Francisco.

Sixty-seven members were registered at the convention. The entertainment and hospitality of San Diego citizens were outstanding features of the convention.

Some of the men who did a great deal to make the convention of the California Association of Electrical Inspectors a success. Left to right—A. E. Johnstone, city electrician of San Diego; R. W. Abright, city electrician of Long Beach; and William Harrison, electrical inspector of San Bernardino. Mr. Johnstone was particularly active in arranging much of the entertainment which was provided for the delegates. Mr. Abright, president of the Association, has been instrumental in fostering the work of the universal ordinance committee.



The Northwest Association of Electrical Inspectors was well represented at the convention of the California Association. Left to right—L. W. Going, electrical inspector, Portland, Ore., president; A. E. Griswold, A. G. Manufacturing Company, Seattle, Wash.; H. A. Patton, Washington Surveying and Rating Bureau, Seattle, Wash., executive committee; Thomas E. Lee, International Brotherhood of Electrical Workers, Seattle, Wash.; and F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, secretary-treasurer.

Meetings

Meeting of Colorado Electrical Men Is Highly Successful

All expectations were surpassed in interest, attendance and results developing from the first state-wide meeting of electrical men held in Denver March 26 under the auspices of the Electrical League of Colorado. This is the report from league officials who advise that because of the success attendant upon the first meeting and the popular interest that already has been developed, it is likely that such an affair will be made an annual event. The attendance at the meeting was 224, a new record for any electric or utility meeting in the Mountain region. More interesting and even more gratifying to league officials was the response of contractors. This division led in attendance with a total of 62 and of this number 29 came from points outside of Denver.

The meeting started early in the morning and continued through the day with a banquet at night. Every phase of electrical and utility association activity in the Mountain region was explained and discussed. This part of the program included papers by C. A. Semrad, president, Rocky Mountain division, N.E.L.A., George E. Lewis of the Rocky Mountain Utility Information committee, and E. F. Stone, president of the Colorado Public Service association. Samuel Adams Chase, special representative of the merchandise division, Westinghouse Electric & Manufacturing Company, was the principal speaker on the afternoon program. His subject was "Selling the Electrical Idea to the Public."

Higher wiring standards, improved inspection and the necessity therefor and other phases of wiring practice were discussed by representatives of the underwriters and inspection departments. The Red Seal Plan was introduced officially at the meeting in the address of S. W. Bishop, exectutive manager of the Colorado league, with a distribution of the minimum wiring standards required for operation of the plan in Denver and vicinity.

One of the surprise features on the program following the banquet was the presentation of little gold replicas of the league insignia to the past chairmen of the organization. Recipients were E. C. Headrick, John J. Cooper, O. L. Mackell, H. D. Randall, W. A. J. Guscott and A. C. Cornell, the present chairman.

Mr. Cornell presided at the opening of the day sessions and was relieved by the vice-chairmen of the league, W. A. J. Guscott and F. F. McCammon. Mr. Cornell served as master of ceremonies at the banquet. L. M. Cargo was chairman of the general committees arranging the one-day convention.

Red Seal Progress Reported to Bureau Advisory Meeting

The Red Seal Plan's progress in California came in for considerable commendation and discussion at the last meeting of the advisory committee of the California Electrical Bureau, held in Los Angeles, March 12. Reports of buildings already being built under the plan, difficulties still to be surmounted and ideas for its extension were discussed. One notable incident was the interest taken by representatives of the telephone company in the plan and the expressed wish of those representatives that wiring for a telephone outlet be considered also in the specifications. To this end a representative of the telephone company will be asked to sit on the advisory committee of the bureau.

Need for some pamphlet to send prospective home-owners, and likewise for methods of reaching the building contractors as well as the architects, was expressed. A slogan for the Red Seal campaign was required, it was felt, and members of the committee were charged with the responsibility of bringing to the next meeting any suggestions for slogans which they might receive or create.

Plans to carry out another June Bride campaign on appliance sales were outlined, and rather than just a "week" the effort is to be urged for the entire month of June, it was decided.

The advisability of establishing a speakers' bureau in the work of the bureau was discussed. This idea was thought worth following up, first from the point of view of the Red Seal Plan, and later to develop into a speakers' bureau on all subjects pertaining to the electrical industry.

COMING EVENTS

Advertising Section, P.C.E.A.—
San Francisco, Calif.,
April 23, 1926

National Electric Light Association—
Annual Convention—Atlantic City, N. J.
May 17-21, 1926.

Electrical Supply Jobbers' Association—
Annual Convention—Hot Springs, Va.
May 31-June 4, 1926

Pacific Coast Electrical Association—
Annual Convention—Biltmore Hotel, Los Angeles
June 8-11, 1926

Associated Manufacturers of Electrical Supplies—
Annual Convention—Hot Springs, Va.
June 7-12, 1926

Northwest Electric Light and Power Association —
Annual Convention—Spokane, Wash.
June 14-17, 1926

Northwest Electric Light and Power Association —
Annual convention — Spokane, Wash.
June 16-19, 1926.

Book Reviews

SIGNAL WIRING.

By Terrell Croft, Consulting Engineer, author of numerous technical books and member of various engineering societies. First edition 1926. 5½ x 8 in. Cloth bound. 349 pages, 464 illustrations. $3. McGraw-Hill Book Company, Inc., New York.

No introduction of the author or of his works as a whole is needed. His gift of presenting practical information in a manner thoroughly understandable and usable by the practical man is followed out in this book. As the author states, signal wiring from the point of view of the man who installs it primarily is a matter of knowledge of circuits. Therefore the author limits himself to an extensive presentation of wiring diagrams and pictorial representations.

Practically every conceivable type of diagram, from the simplest bell circuit to the complicated circuits involved in turbine-room signal systems, is represented in the book. Further than fully explanatory captions for each illustration there is no text in the first fifteen divisions of the book. Signal wiring methods is the subject treated in division 16, and in this division some text is used, heavily reinforced with illustrations.

Transmission Line Handbook, published by the Rome Wire Company, Rome, N. Y. This 62-page, flexibly bound booklet is a compilation of miscellaneous tables, charts, constants and other information useful to men dealing with electric transmission and distribution. Data pertaining to various classes of conductors are given.

A record for attendance was set at the state-wide meeting of Colorado electrical men held in Denver March 26.

Personals

Dr. Michael I. Pupin, president of the American Institute of Electrical Engineers, was the guest of honor of the University of California and the principal speaker at its Charter Day exercises held March 23 in Berkeley. During the ceremonies the honorary

DR. MICHAEL I. PUPIN

degree of Doctor of Laws was conferred upon Dr. Pupin. Three days later he was the guest of honor and speaker at the meeting of the San Francisco Section of the A.I.E.E. In 1874 Michael Pupin, a native of Idvor, Banat, now part of the Kingdom of the Serbs, Croats and Slovenes, landed in New York, a boy of sixteen, without funds and without a knowledge of English; today he is one of the foremost electrical engineers and physicists of his time. In the intervening years he graduated with high honors from Columbia University, returned to Europe for graduate work in physics and mathematics at the University of Cambridge, England, and at the University of Berlin, Germany, and returned to Columbia University. There in 1889 with the late Prof. F. B. Crocker as instructor in mathematical physics he started the electrical engineering department. His earliest work dealt with the study of the passage of electricity through rarefied gases. In 1892 he took up the subject of electrical resonance which resulted in the invention of the employment of tuned circuits for selective electrical reception of signals. In 1895-6 Dr. Pupin developed a method of rectifying both low and high-frequency oscillations so as to make them dectectable by d.c. instruments. In February, 1896, he invented a method of rapid X-Ray photography by laying a fluorescent screen upon the photographic plate, a method now universally employed. In March of the same year he discovered secondary X-Ray radiation. His most famous accomplishment is the invention of the Pupin loading coil, which has greatly improved long-distance telephone transmission by the introduction of suitable inductance coils along the wires at predetermined distances. This invention was acquired by the American Telephone & Telegraph Company in 1901. During the war Dr. Pupin, who served on several important national committees, developed a method of submarine detection by means of very high-frequency sound waves sent out by a panel of vibrating quartz plates. In prosecuting this work he developed a multi-step vacuum tube amplifier which is free from internal noises and does not transmit low frequency under-water noises. In addition to the Edison Medal, which he was awarded in 1920, Dr. Pupin has won awards from the Franklin Institute, the Social Science Association, the Radio Institute of America and the French Academy, and holds honorary degrees from many prominent American universities. Dr. Pupin is now professor of Electro-Mechanics of Columbia University and director of the Phoenix Research Laboratory of the same university.

Dwight G. Phelps, for many years sales manager of the Colt's Patent Fire Arms Manufacturing Company, has been elected vice-president of the Johns-Pratt Company, Hartford, Conn., in charge of sales. The Johns-Pratt Company is an important division of the Colt's company.

W. P. Johnston has been appointed operating head of the Spokane & Eastern Railway & Power Company and the "Inland" interurban system, Spokane, Wash., with the tentative title of assistant general manager. He will succeed Waldo G. Paine, general manager, who died suddenly at his home in Spokane on Feb. 20.

Dr. Oskar von Miller, eminent hydroelectric and hydraulic engineer of Munich, has been awarded the Grashof medal by the German Society of Engineers on the occasion of his seventieth birthday. Dr. von Miller recently paid a visit to America in connection with the proposed establishment of a national museum devoted to engineering and allied subjects.

George L. Hatheway, president of the Clifton Manufacturing Company, Boston, was a guest of the Electric Sales Company, Los Angeles, a short time ago.

Dr. R. J. Wiseman, research engineer of the Okonite Callender Cable Company, Patterson, N. J., recently visited the Pacific Coast. During his tour of investigation he was accompanied by **J. L. Phillips,** San Francisco district manager of The Okonite Company and The Okonite Callender Cable Company.

Frank U. Bliss, Portland district manager of the Pacific Division of the National Lamp Works, was a recent visitor in Salt Lake City.

William H. Lines, assistant to the president, Portland Electric Power Company, Portland, has been put in charge of the railway and bus operations of the company, succeeding **Franklin I. Fuller,** deceased, and also has been elected to the position of director. He retains his title of assistant to the president.

Henry Dralle, of the general engineering department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, a short time ago completed an extensive tour of the Pacific Northwest in the interests of oil well electrification.

Ray Turnbull, Pacific Coast sales manager for the Edison Electric Appliance Company, was a recent visitor in Spokane.

Richard Hall, manager, Illinois Electric Company, Los Angeles, recently departed on a business trip East via the Panama Canal.

D. O. Rusk, formerly one of the assistant engineers of the Curtis Lighting, Inc., of Chicago, has been appointed assistant engineer to **F. S. Mills,** vice-president, Curtis Lighting of California, Inc. Mr. Rusk is a graduate of the University of California.

Dr. Robert Andrews Millikan, director of the Norman Bridge Laboratory of Physics and executive head of California Institute of Technology of Pasadena, Calif., who won the Nobel Prize in physics in 1923, is delivering a series of twelve lectures at Cornell University, Ithaca, N. Y. Dr. Millikan will devote the series to "The Evolution of the Elements" or "Matter and Radiation."

Walter Ayden, formerly manager of the Oakland branch of the Fobes Supply Company, has resigned to become manager of the newly opened Oakland branch of The Electric Corporation, Los Angeles.

Felix Van Cleef, of Van Cleef Bros., Chicago, recently made an extensive tour of the Pacific Coast.

W. C. Sears, formerly of Landers, Frary & Clark, New Britain, Conn., has resigned to take the position of sales manager of the Rochester Stamping & Enameling Company, Rochester, N. Y.

S. E. Gates, manager of the Los Angeles branch of the General Electric Company, has been elected president of the Los Angeles Electric Club, succeeding **J. E. Macdonald.** Mr. Gates has been in Los Angeles since May, 1924, going there from Spokane where for fourteen years he was in charge of the office of the General Electric

S. E. GATES

Company in that city. In Spokane, in addition to his activity in the electrical field, Mr. Gates took a prominent part in civic affairs, particularly in connection with the Chamber of Commerce, of whose industrial bureau he served as chairman during 1923. Since his arrival in Los Angeles Mr. Gates has taken an active interest in the Electric Club, and the members are looking forward to a year of progress under his administration.

Wayne Cargo, son of **L. M. Cargo,** district manager, Westinghouse Electric & Manufacturing Company, Denver, has returned from East Pittsburgh where he has been associated with the Westinghouse company since his graduation from the University of Colorado in 1914, to become manager of the machinery department of the Mine & Smelter Supply Company.

W. O. Roach, of the Roach-Appleton Manufacturing Company, Chicago, paid a visit to Los Angeles a short while ago.

E. D. Kilburn, vice-president and general sales manager, the Westinghouse Electric & Manufacturing Company, East Pittsburgh, spent a day in Spokane recently.

E. A. Phinney, president, Jefferson County Power & Light Company, Golden, Colo., accompanied by Mrs. Phinney, were recent visitors in Los Angeles.

J. A. Hale has been promoted from the position of assistant chief engineer of the Utah Power & Light Company, Salt Lake City, to that of chief engineer to succeed Markham Cheever, who has joined the staff of the Electric Bond & Share Company in New York. Mr. Hale joined the Utah Power & Light Company organization in February, 1913, and during the entire period since that date he has been connected with the engineering department of that company. He was born in Roanoke, Va., in 1888, and during his early life was employed for a number of years in the construction department of the Norfolk & Western Railroad in Virginia and West Virginia. Immediately after his graduation from the Virginia Polytechnic Institute in 1911, he went to Utah and entered the employ of the United States Reclamation Service, where he was engaged in engineering work in connection with the construction of the

J. A. HALE

Strawberry tunnel as a part of the government's Strawberry reservoir project in the Uintah basin. He followed that line of activity for a period of two years prior to his becoming associated with the Utah Power & Light Company. Mr. Hale is identified prominently with the Utah chapter of the American Institute of Electrical Engineers, and is an ardent worker in the interests of that organization.

Mel Hirsch, formerly with the California Electrical Supply Company, and **William Schafer,** formerly with Fobes Supply Company, both of San Francisco, have joined the sales force of the Wholesale Electric Company in that city. **V. L. Maxam** has been appointed credit manager and sales promoter for the same concern.

M. H. Beekman, who has been manager of the service department of the Edison Electric Appliance Company, Inc., Chicago, has been appointed manager of the appliance division to succeed **A. H. Jaeger,** resigned. **D. C. Marble** has been transferred from his position as assistant to the sales manager of the range division to take the position left vacant by Mr. Beekman.

Fred M. Pierce, radio troubleman, represented the San Diego Consolidated Gas & Electric Company at the radio interference conference of Los Angeles radio dealers held in March.

E. C. Hutchinson, vice-president and general manager, Pelton Water Wheel Company, San Francisco, recently left for Philadelphia to attend a conference with officials of the Wm. Cramp & Sons Ship and Engine Building Company, of which the Pelton company is a subsidiary.

R. T. Pierce, manager of sales of relays and switchboard meters, Westinghouse Electric & Manufacturing Company, recently completed a tour of the entire Pacific Coast. Mr. Pierce's headquarters are at the Newark, N. J., works of the Westinghouse company.

P. E. Chapman, who was formerly superintendent of underground distribution for the Pacific Gas and Electric Company in its San Francisco district, has been made assistant electrical engineer for the company in the same division. **R. P. Lutzi,** who has been assistant superintendent, succeeds Mr. Chapman as superintendent of underground distribution, and **H. K. Woodward** has been appointed to Mr. Lutzi's former position as assistant superintendent. All of these men have records of many years of service with the Pacific Gas and Electric Company.

O. K. Jones, formerly with the Great Western Power Company, San Francisco, has resigned to become an electrical inspector for the city of San Francisco.

Ross Hartley, of The Electric Corporation, Los Angeles, recently visited the company's northern branches, which are located at Portland and Seattle.

W. D. McElhinney has been appointed vice-president in charge of sales, Copeland Products, Detroit. He was formerly sales manager of the commercial department of the Frigidaire Division of the Delco Light Company. Mr. McElhinney is contemplating a visit to the Pacific Coast shortly.

Charles E. Hammond, secretary and treasurer of the Signal Electric Manufacturing Company, Menominee, Mich., recently resigned from that connection. He has been succeeded by **W. J. Tideman** of the Signal organization.

Carl Peirce, president, Hubbard & Company, of Pittsburgh and Chicago, was a recent visitor in San Francisco for the purpose of conferring with his company's local representatives, the Pacific States Electric Company.

L. W. Brainard, since 1919 with the Idaho Power Company, Boise, in different capacities, recently has been made superintendent of appliance sales, a newly created position. He was born in Dennison, Iowa, in 1892, but moved to Payette, Idaho, where he received his preparatory schooling. His college career at Whitman College, Walla Walla, Wash., was cut short by two years' service in the army during the World War. After being discharged in 1919, Mr. Brainard entered the service of the Idaho Power Company as storekeeper at

L. W. BRAINARD

Pocatello, Idaho. In 1920 he joined the sales force of the company's commercial department, being assigned to the Pocatello division, and in 1922 was made division salesman in charge of all the sales in that division. He remained in this capacity until May, 1925, when he was transferred to Boise and promoted to take charge of the appliance sales department under **J. F. Orr,** sales manager.

R. G. Chamberlain, district manager of the Electric Household Utilities Corporation, spent a few days in Spokane lately.

F. C. Holtz, chief engineer, Sangamo Electric Company, Springfield, Ill., visited San Francisco lately. While there he conferred with **L. A. Nott,** manager of the Sangamo company in that city.

Frank B. McKnight has resigned his position as joint pole easement agent with the San Diego Consolidated Gas & Electric Company to go into business. He will open offices at 834 F Street, San Diego, where he will conduct a blueprinting and photostating business and also deal in general engineering supplies.

Obituary

Walter B. Jones, Seattle, until recently district representative of the Economy Fuse Company in Seattle, died of a heart attack on March 7. Mr. Jones had been identified with the electrical industry in Seattle for ten years, the last four with the Economy company.

TRADE NOTES

The Edison Electric Appliance Company, Inc., Chicago, is putting on the market its new Hotpoint Calrod electric iron. This iron, which in appearance is the same as the Hotpoint Thumb Rest, contains the Calrod heating element which the company claims multiplies many times its efficiency, speed of operation and durability. In the Calrod process, after the nickel chromium tube has been filled with magnesium oxide powder in and around the helical coil it is compressed in diameter so that the magnesium oxide is as hard as granite. This construction makes it possible to bring the current in with a heavy terminal conductor and make the joints away from the air. A further advantage claimed for Hotpoint Calrod is that molten iron can be poured around it in a mold, encasing the heating element inside solid metal, where it is sealed in forever and protected against physical abuse or damage.

The Driver-Harris Company, Harrison, N. J., has appointed **J. C. Bilek** as Chicago district manager for the company. **H. D. Tietz** will be associated with Mr. Bilek as assistant district manager.

American Wiremold Company, Hartford, Conn., has increased its capital stock from $200,000 to $600,000. The company makes wire conduits and flexible wire, and it is now to develop new wire specialties paralleling its present lines. The new directors chosen were **W. K. Murphy** of Los Angeles, **H. B. Kirkland** of New York City and **D. Hayes Murphy.** The latter was chosen as president and treasurer with **H. B. Kirkland** as vice-president and **W. D. Ball** secretary.

Graham Brothers, Detroit, has issued a 68-page booklet, "Trucks for Public Utilities," containing facts for the guidance of public-utility operators in the selection of motor trucks. The book is illustrated fully and contains reproductions of the various types of trucks manufactured by the company. A full-page reproduction of the Royal Gorge in colors is shown on the frontispiece and other scenic effects of power developments are given in the book.

The Western Sales & Engineering Company has been organized in Denver as representatives and distributors of the Electric Refrigerator Corporation. The complete line of that company will be handled, including Kelvinator equipment, Grand Rapids and Leonard refrigerators, and Nizer Corporation units. The new company is located at 1163 California Street.

Bakelite Corporation, New York, has issued a folder entitled, "Bakelite Supersedes All These Materials," the materials named being amber, celluloid, fibre, gallalith, glass, horn, ivory, jet, metal, paper, porcelain, rawhide, rubber, shellac, vegetable ivory and wood. Illustrations show various articles made of Bakelite that formerly were made almost exclusively of the materials named.

Delco Light Company, Denver, has established new headquarters for Frigidaire refrigerating equipments with the opening of an uptown sales office and demonstration room at 1134 Broadway, in the heart of the automobile district. This action follows the closing of the refrigerator school recently conducted by the company in Denver for its dealers and salesmen in the Mountain region and the launching of a comprehensive newspaper advertising campaign.

An engineering conference as to the stresses and inductances due to niblick or mashie on the course of a golf ball is holding these two experts teed. George E. Quinan, chief electrical engineer, Puget Sound Power & Light Company, Seattle, says niblick. L. N. Robinson, electrical engineer, Stone & Webster, Inc., Seattle, however, thinks it should be something else again.

Curtis Lighting, Inc., Chicago, has added the Canadian Provinces, Alberta, Vancouver and British Columbia, to the territory covered by its resident engineer, Charles T. Boyd. His territory formerly consisted of Washington, Oregon, Idaho and Montana. He makes his headquarters in the Douglas Building, Fourth Avenue and Union Street, Seattle.

Allen & Billmyre Company, Inc., New York, is manufacturing a new design of semi-heavy-duty portable vacuum cleaner with dust-blower attachment, which is especially adaptable to hotels, office buildings and hospitals. The machine is equipped with a ½-hp. universal Westinghouse motor and weighs 105 lb. It is compact and ruggedly built and can be classified as standing between the small household vacuum cleaner and the heavy-duty portable and stationery pneumatic sweeping systems for industrial work.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, now is building the Westinghouse automatic iron with a heel rest in place of the separate stand formerly used. With this rest the iron can be turned up on its heel and placed anywhere without danger of burning the material on which it rests.

Jefferson Electric Manufacturing Company, Chicago, has produced a new bell-ringing and signal transformer, which is attached to an outlet box cover and will be known as the "Nucode." It is designed for the average residence or small apartment.

The American Resistor Corporation, Philadelphia, recently has placed on the market Globar non-metallic heating elements in diameters up to 1⅝ in. and 2 in. The increase in available diameters offers a means of securing greater kilowatt capacity per unit and hence fewer units are required in any one furnace application.

Kliegl Brothers, New York City, have issued a new 128-page catalog entitled "Kliegl Theatrical Decorative Spectacular Lighting." The book is complete in every detail with illustrations and price lists and minute descriptions of the various types of lighting effects.

The Domestic Electric Company, Cleveland, recently has placed on the market a small but sturdy universal motor, especially adapted to use on industrial jobs for which hand power is not satisfactory yet which requires a light, portable power unit. The motor weighs only 42 lb. and is particularly useful for operating appliances like pipe-threading machines, small grinders, wood shapers and routers, portable drills, etc.

The Ohio Brass Company, Mansfield, Ohio, has issued a small booklet on "Gas-Welded Bonds on the Erie." This is a reprint of an article appearing in the March issue of Railway Signalling by C. A. Nichols, signal supervisor, Erie Railroad, Huntington, Ind.

Electric Service Supplies Company, New York, Philadelphia and Chicago, has issued bulletin No. 220 on Keystone expulsion type lightning arresters. The subject is covered fully and illustrated with photographs and drawings.

The United Electric Company, Canton, Ohio, has made improvements in the complete set of Ohio electric cleaner attachments. Changes are being made in the brushing and suction tools so as to furnish a combination tool which can be used either with or without the brush. This new combination tool will replace separate brush and suction tools.

The United States Electric Company, San Francisco, has moved into larger quarters and now is located at 1038 Polk Street.

The Electrical Supply & Construction Company of Denver has been named a distributor of the lighting fixture line produced by the Markel Lighting Fitments Company of Chicago.

General Electric Company, Schenectady, has issued a 33-page illustrated publication, which presents authoritative information on means for power factor improvement in industrial plants.

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